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A GUIDE FOR STATE CERTIFICATION OF WASTEWATER FACILITIES PERSONNEL

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A GUIDE FOR STATE CERTIFICATION OF WASTEWATER FACILITIES PERSONNEL

The Report on a Study
of State Programs to Certify Personnel
in Water Pollution Control Facilities

by

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for the

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ACKNOWLEDGMENTS

Over several years the groundwork which made this study possible was accomplished by George W. Burke, Jr., and John A. Voegtle of the Water Pollution Control Federation (WPCF) staff. Throughout the project, their experience, knowledge and wisdom concerning all aspects of the subject provided counsel that was invaluable to the project director. Periodic advice from the Environmental Protection Agency (EPA) also contributed significantly to a broader view, especially from Robert C. Rose (the EPA project officer) and Morton S. Ettelstein of the Manpower Development Staff and Royal C. Thayer of the Municipal Wastewater Systems Division.

For the purpose of reviewing this work the WPCF appointed a special task force chaired by John R. Bettis, manager and engineer with the Commissioner of Public Works of Charleston, South Carolina. Task force members came from the WPCF Personnel Advancement Committee, which has responsibilities in the fields of operator qualifications and manpower needs. Also, one of the first actions of the newly created Association of Boards of Certification (ABC) was the appointment of a Rules and Regulations Committee, chaired by C. R. Holden, a member of the Oklahoma Certification Advisory Committee. This ABC committee also was given the immediate charge to review this WPCF project and to offer advice. The valuable counsel received from both groups is gratefully acknowledged.

The 45th Annual Conference of the Water Pollution Control Federation took place just prior to the completion of the project. A special Workshop on Operator Training was scheduled two days before the Conference, attracting key individuals who deal with training and certification from all sectors of the water pollution control field. The opportunity was presented for an in-depth discussion on the elements of this study. Accordingly, a paper was presented to the workshop of about 180 registrants, describing the key issues revealed by the study and the tentative conclusions. An effort was also made to describe in some detail the rationale or philosophy which supports the state certification programs for personnel in water pollution control facilities. This background philosophy is restated in Section III.

One of the six designated "study groups" at the workshop was assigned the specific topic of certification. They spent much of two open discussion sessions commenting on the certification issues raised by the earlier paper. Participants included members of both the WPCF task force and the ABC committee assigned to review this project. As anticipated there was a most valuable open discussion of the issues among individuals representing such diversified interest groups as federal, state and local governments, education, industry, and municipal operations personnel. The conclusions and recommendations of this project were both strengthened and refined through this process.

Finally, the work which forms the basis of this report has been accomplished largely by Claiborne W. Brinck, special project consultant to the Water Pollution Control Federation. His knowledge, experience, ability and energy made possible the completion of this project in a short span of time. This activity, undertaken immediately after his retirement as Montana's state sanitary engineer, is further evidence of his dedicated effort toward the goal of improving our environment through insuring constant operation of water pollution control facilities.

Mr. Brinck's example provides eloquent testimony to the similar dedication from state officials and other concerned members of the profession who have brought, pushed, and shoved state certification programs up the ladder to their present level of widespread acceptance. Their continuing devotion to the goal of an effective certification program was revealed time and again during this study. Appreciation is expressed for the excellent cooperation we received from state officials and others visited. It should be emphasized that today's recommendations for improving these programs in no way detract from the accomplishments of the many individuals who have labored for similar goals over the past fifty years, including the lonely years before the public awoke to the importance of environmental quality.

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SECTION I - EXECUTIVE SUMMARY AND RECOMMENDATIONS

In order for the United States to achieve its objectives in the field of water quality it is essential not only that adequate facilities be provided, but also that qualified personnel operate and maintain these facilities. This is one of the goals of the U.S. Environmental Protection Agency (EPA) as has been demonstrated by the activities of its Manpower Development Staff in the Office of Water Programs Operations. Certification of operating personnel has been recognized as a valuable legal mechanism to assist in achieving the goal of qualified operations personnel. Both the Environmental Protection Agency and the Water Pollution Control Federation (WPCF) support this approach.

Certification programs for personnel in water pollution control facilities now exist in almost all states, many of which have only recently passed mandatory certification laws. The diversity among the programs is recognized as being greater than necessary and most of the state programs recognize a need to strengthen and improve their effectiveness. To provide guidance toward this goal, in early 1972 the Water Pollution Control Federation agreed to undertake a project supported by a grant from the Environmental Protection Agency—Office of Water Programs Operations (EPA-OWP). The project report was to include a state certification program guide.

The study began in May 1972 and included a detailed examination of six state certification programs selected to be representative of the national situation. In addition, survey information was used from all 50 states and the project was discussed openly at meetings of the Association of Boards of Certification (ABC), which was formed during the course of the study. The project was also discussed at the WPCF workshop on operator training held at Atlanta Georgia in October 1972. Certification programs in other fields were investigated and interviews were conducted with individuals in related fields of interest, such as labor unions and federal agencies.

The study found that certification of personnel in water pollution control facilities has become widely accepted throughout the United States as a legitimate state requirement. In addition, the personnel themselves find the concept and the practice beneficial. However, the rapid growth in state certification programs has led to unnecessary diversity which weakens the effectiveness nationally. The recent movement to form a national association of state programs offers great promise of providing successful solutions to the problems.

The study found several gaps in the fundamental information necessary for upgrading the vocation of operating and managing wastewater facilities. Efforts of the EPA to stimulate the development of such information—thereby benefiting planning, training, and certification programs—are commended. It has been emphasized that certification, in order to be most effective, must consider and cover the entire vocation rather than apply only to the "man in responsible charge."

Based on the information revealed, and the direction charted for future certification efforts, a GUIDE was prepared for STATE CERTIFICATION PROGRAMS. In the GUIDE an attempt has been made to describe what are considered to be the details of an effective state program.

Recommendations

The following recommendations are made for the purpose of improving certification programs for operating personnel in water pollution control facilities. They are based on the premise that under existing conditions, national water quality goals can be significantly enhanced through strengthening state certification programs. Therefore the federal program should be designed to accomplish this objective. A corollary to this premise is that state programs can and should cooperate through a national instrument to establish and meet minimum standards, reduce diversity, and facilitate reciprocity.

1. The GUIDE in this report should be considered as preliminary to nationally approved guidelines for state certification programs. As the states reach a concensus on the desirable features of certification programs, these features should be incorporated in a set of standards or guidelines and the EPA should encourage each state to bring its program in substantial compliance with the national standards.

2. The following program elements require early attention by the states:

   a. Regardless of its location within the state government the certification program should be provided with sufficient autonomy and budget to accomplish its objectives. Funds earmarked for certification should include all revenue from certification activities such as examination fees and renewal fees.

   b. The certification program should be separately administered from the training program, at least to the extent that both programs are not the responsibility of the same individual.

   c. Coverage of the mandatory certification requirement should be broadened to apply to all water pollution control facilities within the state which discharge to water or land in a way that might jeopardize water quality.

   d. A sound national classification system for facilities and personnel should be developed and then applied by the individual states.

   e. There should be a separate certification program for operators of industrial waste treatment facilities, but it should be administered by the same governing board or organization.

   f. Easier reciprocity should be one of the goals of program improvements.

   g. An acceptable set of national examinations should be utilized by state programs.

3. State certification programs should move promptly to coordinate their efforts, and to cooperate nationally toward improving certification. The ABC provides a logical mechanism for their joint activities.

4. The EPA should support and encourage efforts toward the adoption and improvement of *mandatory* state certification programs and reduce their diversity. Such support should include:

a. Continued endorsement and support of the efforts of mandatory state certification programs to upgrade their own activities through national cooperation.
b. The adoption, where appropriate, of mandatory certification program standards as a qualifying feature of programs which seek to meet the construction grants requirements for qualified operations personnel.
c. Mandatory state certification programs should be a high priority item in the allocation of federal grants to state water pollution control programs and should be eligible to receive substantial grant funding.
d. Where appropriate projects of ABC will improve the national effectiveness of certification, federal support should be made available to expedite their accomplishments.

5. Through separate or joint efforts of the Environmental Protection Agency, Department of Labor-Manpower Administration, and Office of Education-Department of Health, Education and Welfare and with appropriate use of the private sector, practical research should be pursued in producing the fundamental information concerning optimum operation and management of water pollution control facilities, and identification of the necessary qualifications for careers in this field. Such projects should seek to apply modern task analysis procedures to the wide variety of job environments. To provide data that is useful and that can be applied, it is essential not only that the up-to-date knowledge of the academic community is employed, but also that such projects be directed by individuals experienced and qualified in the water pollution control field.

6. A program should be initiated immediately to survey all federally owned water pollution control facilities in the nation and to determine their compliance with the President's Executive Order No. 11507. All federal agencies with installations which have water pollution control facilities should be encouraged to implement the Executive Order by voluntary action; thereby bringing their facility into compliance with the state certification program. The EPA has the responsibility to move strongly within the federal government to disseminate information about this policy and to see that it is properly implemented.

7. The EPA should bring to the attention of the federal Civil Service Commission the latest practices and requirements of state certification programs and the ramifications of the President's Executive Order concerning federal facilities. Possible actions which might be encouraged include:
a. A requirement that operators of federally owned facilities meet state certification requirements in order to meet the civil service job description; or
b. An accompanying note to all prospective employers and employment agencies that there is an additional requirement for state certification prior to employment; and
c. Periodic updating of civil service job descriptions and classifications of water pollution control facility personnel to match the latest data suggested by EPA, ABC, and WPCF.

8. EPA's national program should include close coordination with the ABC, the WPCF, and other organizations for the accomplishment of the program recommended herein.

SECTION II - STATE CERTIFICATION PROGRAM GUIDE

The following guidelines have been developed for state wastewater operator certification boards to consider when undertaking changes in various phases of their program. The material is designed to answer the key questions which all boards face in establishing or modifying rules, regulations and procedures.

1. General

The justification for a mandatory state program to certify personnel in wastewater facilities is to assure competent operation of these facilities for the protection of public health and the environment. Accordingly, all water pollution control facilities which may discharge to a receiving water course or to land where water quality is in jeopardy are covered by this program. This includes facilities owned and/or operated by public or private utilities at the local level, by state agencies, and by industries. Collection and pumping facilities are included in the definition of wastewater facilities, as well as treatment facilities.

The certification program should be available to all personnel who can meet the minimum qualifications for a given classification. A career ladder should be implicit in the classification system. Each individual is encouraged to apply for certification in the highest classification consistent with his qualifications.

The legal authority for a state certification program should be patterned on the 1972 Model Law of the Council of State Governments, at this time. Eventually, a new model law prepared or endorsed by the Association of Boards of Certification (ABC) may take precedence.

2. Board of Certification

The program should be governed by a Board of Certification rather than handled as an agency staff function. The Board should be responsible for the adoption of rules of procedure and policy and for the general direction of the program.

If the program is part of either the health department or environmental agency, with the Board serving officially in an advisory capacity, the Certification Board's stature should be such that its recommendations will be respected by the state agency.

The Board members should include voting *ex officio* officials from the state agency (agencies) responsible for health and water pollution control and others appointed by the governor. The appointed members should include a local government employee in a management position and a management representative of an industry, each of which owns and operates a water pollution control facility. One appointee should be a faculty member of a college, university, community college, or vocational technical school having a related water pollution control training program.

A large minority of the board members should consist of active operating personnel holding valid certificates. These individuals should be appointed to represent different segments of operations such as 1) municipal collection facilities, 2) municipal treatment facilities, and 3) industrial facilities. The total membership of the board should not exceed 12.

Board members should serve for 3-year terms which are staggered so that the terms of one third of the board members will expire in any single year. Board members may be reappointed but should not succeed themselves automatically and should not serve more than three consecutive terms. Each year the board should select, from its membership, a chairman and such other officers as may be needed to conduct its business.

If the board is located in a state licensing agency, a staff representative should serve as board secretary and treasurer and be responsible for maintaining records. If the board is located in a health or environmental agency, the designated board member from that agency should serve in the same capacity with the same responsibility.

All board members should be reimbursed for their actual and necessary expenses incurred while discharging their official duties. An honorarium for days contributed is optional. It should not be necessary for the Board to meet more frequently than once a month and, when fully operational, less frequently.

3. Staff

The certification program should be furnished with adequate staff to administer the program under the direction of the board. Duties which apply only to the certification program include those related to application processing, examinations and renewals. For certification duties alone there should be one staff member per 1,000 active certificates. This can be supplied by one or more persons working part time, but staff should not be assigned the responsibilities of both training and certification. Staff requirements will vary widely depending on program requirements such as whether the program is changing; whether data processing is used; the amount of time devoted to the program by Board members; and the method of preparing, conducting and grading exams.

The key individual responsible for managing the program, usually identified as the secretary, should be properly qualified to handle all day-to-day business. He prepares material for board meetings; he receives fees and deposits them in the proper account. He sends out applications as requested, reviews completed applications, arranges locations for the examinations, arranges for proctoring and for grading the exam. He issues the new certificates and renewals as directed. He keeps track of the requirements for certified personnel in all facilities throughout the state and the extent of compliance with these requirements.

In states with 500 or more certificates it would be desirable and most efficient to utilize data processing in maintaining records of active certificants and renewals. An additional benefit would be more accurate records as to the compliance of facility owners with certification requirements.

4. Budget

Fees should be established so that the certification program will be self-supporting, at least to the extent of direct costs. Fees may be charged for application, examination, re-examination, and renewal. All fees received should be kept in an earmarked fund available for use by the certification program.

Fees should be established by the Certification Board, at the level required to maintain the program but not greater than the following maximum limits:

(a) application - $15.00
(b) examination - $15.00
(c) re-examination at same level - $15.00
(d) renewal - $10.00

To avoid excessive fees which become a burden to the individual certificant, it is desirable that some costs be defrayed under the state budget. This can be accomplished by absorbing the overhead cost of space, equipment and computer time within the budget of the agency which houses the certification program. Other costs directly attributable to certification such as direct staff cost, supplies, postage, examination costs, board member expenses, and membership fees in ABC should be supported in the certification program budget. The importance of program autonomy is shown in that if the host agency is unwilling to subsidize the overhead, fees may then be raised to the level necessary to provide a completely self-sufficient program.

5. Application

An individual desiring to be certified should file application with the board not later than one month preceeding the date of the examination, on an application form provided by the board. When available, a standard national application form should be used. The board staff should assemble all information needed by the board to determine eligibility of the applicant for examination and certification. The board should review applications and supporting documents, determine the eligibility of the applicant for examination and notify him of the status in writing.

6. Examination

The board is responsible for the examinations to be used in determining knowledge, ability and judgment of the applicants. Examinations may be prepared by the board, prepared by a special examination subcommittee, or purchased from a reliable and secure outside source. The use of examination specialists is encouraged, but their role should be advisory to those with the appropriate technical expertise. The emphasis should be on testing realistically the individual's qualifications for a certain level operations position. In the lower classifications all questions should be multiple choice type. It is not effective to have industrial waste personnel take an exam designed to cover only domestic wastes.

Examinations should be held at places and times set by the board on a semi-annual schedule. Several locations at one time may be desirable to meet a large demand. Suitable announcements should be made at least six months in advance so that potential applicants are aware of coming examinations while time remains to apply.

Examinees should be required to sign a register when picking up their examination paper. Each examinee should be given a number, which may be either a code number or his social security number. This should be the only identification on the examination paper. The examination papers should be graded promptly, that same day if at all possible. The examination should not require over four hours, and a maximum time limit should be established. Following each examination the questions should be carefully re-evaluated by the board to provide guidance for future examinations.

Except in such cases as the board may decide represent proper exceptions, all examinations shall be written. All examinations should be graded by the board, or by others designated by the board, and the applicant should be notified of the outcome. Papers should not be returned to the applicant, however, the exam may be reviewed on request at the office of the board. Applicants who fail to pass the examinations may repeat the exam at subsequent regularly scheduled exams.

7. Issuance and Renewal of Certificates

On satisfactory fulfillment of the requirements based on the recommendations of the board, a certificate should be issued to the applicant, designating that he meets the qualifications. This one-time certificate should indicate the name, the class position for which the individual is qualified and the date of certification. The certificate should be permanent unless revoked for cause, replaced by one of the higher grades, or invalidated due to failure to meet renewal requirements.

Certificates should be subject to annual renewal, including a renewal fee, which establishes that the individual continues to meet qualifications to the satisfaction of the board. In order to justify renewal the certificant should indicate on the renewal form the amount of his working time spent in operations work over the previous three years, and the additional or continuing education program(s), by identification, in which he has participated during the previous three years. Over the three-year period, failure to remain active for at least 20 percent of his time should mean automatic rejection of certificate renewal. Likewise, failure to attend at least 24 hours of approved continuing education within the three years should mean automatic rejection of certificate renewal. The board should consider the availability of training programs in its determination of what is "acceptable."

Failure to furnish the desired information also should constitute grounds for refusal to renew. Certificates should be valid only so long as the holder uses reasonable care, judgment and knowledge in the performance of his duties. No certificate will be valid if obtained or renewed through fraud, deceit, or the submission of inaccurate data on qualifications.

8. Reciprocity

Certificates may be issued in a comparable classification without examination to any person who holds an operator's certification from any state, territory or possession of the United States or any country if, in the judgment of the board, the requirements for certification of operators under which the person's certification was issued do not conflict with the requirements of their program and are of a standard not lower than the requirements of their program. Compliance with standards that may be recommended by the Association of Boards of Certification should be considered in reaching the decision as to comparability.

9. Revocation

The board may revoke a certificate, following a hearing before the board, when it is found that the certificant has practiced fraud or deception; that reasonable care, judgment or the application of his knowledge or ability was not used in the performance of his duties; or that the individual is incompetent or unable to perform his duties properly. Appeal from the decision of the board may be made to a court or competent jurisdiction.

10. Classification of Facilities

An interim guide for the classification of facilities has been proposed for development in the near future as one of the first products of the Association of Boards of Certification. For this reason, no new classification system is suggested at this time. Temporarily the simple classification guide in the regulations which accompany the 1972 model law may be used. However, a special classification may be required under the suggested broader coverage of facilities for application at extremely small or remote facilities employing only part-time personnel. Several facilities may be served by one certified individual through the mechanism of consulting operators.

It is envisioned that the ultimate classification system must be more complex whereby actual skill and knowledge requirements will play a more prominent role in the classification. Possibly a point system, such as has been developed by the Ohio and the Wisconsin programs, will be the next step in facility classification. Separate, but related, classification systems are required for industrial waste facilities and for collection systems. Much of the information in the industrial classification field has been developed by the Michigan certification program. Ultimately, the classification of facilities may become sufficiently sophisticated, through the use of analytical techniques, that the facility classification will be dependent upon the qualifications of personnel required to operate the facility.

11. Classification of Personnel

Classification of operations and management personnel to be certified must follow the principle that certification describes a career ladder and is not limited to the man "in responsible charge" of a facility. Re-orientation to this approach is essential for certification programs to reach optimum effectiveness. Such a classification system would comply with fundamental principles and provide national leadership in the creation of standard personnel classifications which may be applied to certification programs, training programs, and staffing guides. Personnel classification is also part of the proposed ABC interim classification project.

While awaiting a new and stronger national classification system, state programs may avoid further diversity by following the operator classifications which accompany the 1972 model law, recognizing that these were established to cover only positions in responsible charge of the respective class facilities. It is strongly recommended, however, that all personnel in the vocation of operations and management of water pollution control facilities be encouraged to obtain certificates at the highest level of their ability. It should be emphasized that applicants are not limited to the individuals presently "in responsible charge," and that obtaining a certificate before it is required by law makes an individual eligible for a higher level position.

12. Qualifications of Personnel

Qualifications for each level of classification are, of course, dependent upon the classification system. Therefore, a rational description of specific qualifications must await the determination of a personnel classification system. The approach used in the 1972 model law is highly recommended, both for present application and for eventual modification to accommodate a new system.

Minimum educational goals and minimum experience goals have been established for each existing classification. In the higher levels, a specified part of experience must include "major responsibility." Guidelines have been established which describe the substitutions for formal education which may be made both from informal education and from additional experience. Guidelines also describe the type of experience required and the degree to which additional education may be substituted for the experience requirement. However, unlike the educational goals, the experience goals include a flat minimum requirement for which substitutes are not acceptable.

In addition to education and experience, applicants are required to give evidence of good moral character, dependability, initiative, interest in the work, and other pertinent characteristics in relation to these positions.

13. Enforcement

The entire mandatory certification program is greatly reduced in value if the requirements are not enforced. This includes both the requirements for water pollution control facilities to employ certified personnel and the requirements for certification to be limited to qualified and responsible individuals. The certification board must provide the direction and the necessary staff work must be accomplished to obtain the information necessary to determine compliance with these requirements and to act on this information where there are violations. It is noteworthy that the new Council of State Governments Model Law provides penalties of $10,000 per day for violation of the act. This is a striking change from the earlier model law which made violation a misdemeanor. The penalties are applicable to the owner of the facility, the uncertified individual who illegally performs the duties, or both.

It is essential that the certification program maintain an up-to-date accurate account of all facilities in the state which require certified personnel, of the specific positions in each facility which require a certified individual, and of the certification status of the individuals who fill those positions. With the necessary information available, the board should act on this information to see that violators are prosecuted.

The second enforcement responsibility of the certification program is equally important. A requirement to employ certified personnel cannot be justified if the certification does not bear a clear tie with qualifications. Certification authorities, for this reason, must not allow their programs be used merely as a device to encourage training. A "too

easy" program which assures a certificate to everyone taking the exam is destructive of the foundation for this authority and will be forced to deal later with unqualified, yet state-certified individuals.

In any case, the board should be prepared to face the problem of an individual possessing a certificate who does not measure up to the standards of knowledge, ability, responsibility, or integrity required for such a position. If the program is effective, the board must not fail to exercise its responsibilities to remove the certificate from such an individual. In appropriate cases, the revocation procedures should be followed. States with annual renewal requirements may be able to use less extreme measures by discouraging renewal application or refusing to grant renewal.

SECTION III - INTRODUCTION

In order to consider the optimum course which should be recommended for state certification programs in the field of water pollution control facilities it is important to understand the purpose of these programs. In the more than 50 years during which the concept has been advanced, many descriptions have been given of the good that would result from such a certification program. Essentially these can be reduced to benefits for the certified personnel, benefits for the employers of certified personnel, and benefits for the general public. The individual is told that, if he holds a certificate and fills a position requiring a certified person, he will receive greater respect, a higher salary, and will have the backing of the state in asserting his responsibility to do his job right. The employer is told that he will have greater insurance that a new man is qualified for the job he seeks, less fear of hiring a fast-talking incompetent or misfit, and greater security that the facility will be operating at its design level of performance, thereby avoiding a violation of state law and a conflict with state officials and the public. The public is told that certification means qualified people protecting the waters of the state from pollution, instead of happenstance selection of key personnel without the safeguard of state testing, and further insurance that publicly owned facilities will be operated properly and maintained well. This combination of aims explains the widespread support for state certification that is present today.

Although there are many benefits intended for a state certification program, the only legal foundation is the police powers of the states. Under this tradition a governing body inherently has the power to protect the public health and welfare, while incompetent operation represents potential hazards to health and to our water resources. Therefore it is in the best interest of the public to certify the qualifications of water pollution control facility personnel. As in most licensing procedures, this has been demonstrated to be much more easily said than done.

As a matter of fact, it is doubtful that any certification or licensing procedure can be 100% effective to the extent that it guarantees the qualifications of every single individual possessing a license or certificate under that program. By using the above objective as a goal, however, it is possible to approach this effectiveness to a high degree. The end result of a good program, therefore, would be to insure the public that it is quite difficult for an incompetent person to obtain a certificate, because we have measured his qualifications as well as we are able and he has "passed the test." Such a program should be as high as 95% effective and should provide ample justification for public confidence in the competence of certified individuals.

Since we are dealing with a technical field that has existed for approximately one century in the United States and currently contains a large number of productive individuals, a fundamental problem arises in establishing the qualifications of the "competent operator" by whom we are to measure certificate applicants. Is this "competent operator" the average of the existing operators in the field? Or is this "competent operator" some theoretical individual possessing a high degree of education and training, who would be ideally equipped to operate the sophisticated water pollution control facilities of the future? There are strong reasons to support either choice but there is a very wide gap between them.

If we select the former course and ignore the latter, in this rapidly-changing field in a rapidly-changing world, we risk destroying the program by setting our goals too low and providing valid certificates to individuals unable to measure up to the higher standards required by tomorrow's facilities. If we select the latter course and ignore the former, we almost certainly will damage the existing corps of dedicated and able personnel employed in this field because, in large measure, they are not highly educated. What is more, we will destroy the program in another way because, under present circumstances, the salaries available to water pollution control personnel are totally inadequate to hire the superior professional who could survive such a certification procedure. Reason dictates that our course must lie between these two alternatives.

There is another significant function of the certification program. Certification can serve as a highly effective incentive for raising the qualifications of employed individuals in the field. A mandatory requirement for certification can weed out the least competent, and it can require the marginally competent to obtain a minimum amount of training sufficient to upgrade their skills and knowledge.[1] Each new certification program has had a demonstrated effect in increasing training program enrollments. Furthermore, by tying certificate renewals to additional training, it is possible to continue this steady overall improvement in the competence of certified personnel.

A negative factor of the certification concept must also be considered. It is a fact that in some states, in some fields, a certificate or license is considered primarily a means to restrict the influx of new people. The licensing board, controlled by the members of that trade or profession, has used their powers as an economic weapon, maintaining a high demand for their services by restricting the supply of legally qualified individuals. This practice has led some state legislatures recently to question the whole state licensing procedure and to declare a moratorium on new programs. Although there are probably few employment fields in the country with a greater need to upgrade their income, this fear is not a valid one in water pollution control facilities.

To begin with, the programs which certify wastewater facilities personnel are not exclusively controlled by operations people. Indeed in most states, the certified operator has, at best, a minority representation in the certification program. Most existing programs have their greatest influence from the state agency (agencies) responsible for public health and water pollution control. Additional representation on the certification board or committee usually includes a training/education authority and the owners of water pollution control facilities. Balanced composition of certification boards is a strongpoint of many existing programs and should be a goal for all.

Thus there is little or no justification for a fear that this mechanism will be used to deny job opportunities in the field

to capable individuals. Indeed, a questionnaire to state certification programs revealed a number of authorities who felt their program was not yet effective in making it difficult for *unqualified* individuals to become certified. Virtually none, however, believed that their program was so restrictive as to make it difficult for qualified new entrants to become certified. Significantly, 35 of 37 responding authorities indicated a belief that they were successful at raising the qualifications of personnel already in the field.

As the qualifications required are elevated, justice requires that a means to meet the new requirements be furnished to individuals currently employed in the water pollution control field. Here, as in so many other ways, the relationship between training and certification programs is vital. A state cannot equitably require higher qualifications of an operator than can be obtained through reasonably available training. This is a field where federal support has a major role to play, provided there can be some national consensus on what types of training are needed.

Finally there is a role for certification programs in bringing some unity or order out of the chaos in present staffing of water pollution control facilities. The field of plant operations and management is a distinct discipline with a presently ill-defined career ladder. The selection of a grade classification system for certifying plant personnel can be critical in the development of professional operations careers, by providing a mechanism to retain *and advance* individuals within the utility field. Certification lies at the center of this central problem concerning effective operation of water pollution control facilities.

Accepting the premise that a state certification program should begin with recognition of the valuable corps of established operations personnel in water pollution control facilities gives us a realistic point of departure. In order to justify the legal foundation of certification, we must also accept the goal of attempting to insure the qualifications of operators in the more sophisticated and complex facilities which we know will be required for water pollution control in the near future. Further it must be recognized that different state certification programs are at different levels in approaching this goal.

From the national level, it is apparent that we must encourage those behind to catch up. Meanwhile, the functioning programs cannot slow down, but must attempt gradually to increase the qualifications level of entry into the water pollution control field and, at the same time, to upgrade the qualifications of those who entered the field when the requirements for competent facility operation were lower. This will not be an easy task and it calls for a flexible program that can exist in a state of gradual change over the next decade or longer.

SECTION IV - PROJECT DESCRIPTION

Problem

Manpower is a vital factor in the accomplishment of water quality objectives. The effectiveness with which wastewater treatment plants are operated and maintained is dependent upon the quality of personnel employed in these plants. A valuable tool for assuring employment of quality personnel is certification. Certification is a legal mechanism whereby jurisdiction can require individuals who are engaged in a defined occupation to demonstrate that they are competent to undertake the duties and responsibilities of their occupation. However, the extent to which the goals are met is obviously dependent upon the effectiveness of the certification programs. Questions have been raised concerning the effectiveness of state programs to certify operating personnel in water pollution control facilities.

Importance to Objectives

EPA regulations require that wastewater treatment plants which are constructed with the support of federal grants must be staffed by personnel meeting "requirements under state certification programs or other requirements established by the state and federal governments." Executive Order No. 11507 (February 4, 1970) required that operators of federal government wastewater treatment plants also meet certification requirements of the states in which they are located. Numerous other actions of the federal government indicate the growing recognition over the past several years of the need to provide qualified personnel to operate and maintain the water pollution facilities now being built or upgraded all across the country.

The Water Pollution Control Federation has taken the lead in promoting state certification programs for water pollution control plant operators. Mandatory certification has been a provision in the WPCF Statement of Policy since it was first adopted in 1960. The WPCF Personnel Advancement Committee was originally established in 1941 to "establish minimum qualifications for operators of various classes of treatment works". The Federation continues to emphasize the importance of operations in achieving water quality objectives.

Assisted by funds from a earlier federal grant, ITTI-WP-32-03 from the Federal Water Pollution Control Administration to promote mandatory certification of wastewater facilities personnel, WPCF support was given to various state certification authorities toward the formation of an association of certification programs. In June 1972, this effort succeeded with the organization of the "Association of Boards of Certification for Operating Personnel in Water and Wastewater Utilities (ABC)." Their primary goal is improved and strengthened certification programs. Through cooperation and communications among the many existing and new certification programs, their improvement and strengthening will be much easier.

Purpose of Study

The purpose of this study was to obtain information and develop a model or guide that will provide the basis for obtaining optimum benefits from the state certification mechanism toward the goals of the national water quality program. By examining existing certification programs, evaluating progress achieved under the various state approaches, and assessing the recommendations of the personnel who manage these programs and those who are directly affected by them, it was possible to describe a state certification program which should combine optimum effectiveness with maximum acceptance by the key agencies involved. It is also intended that the results of this effort be beneficial to related needs of other environmental programs.

Background

The practice of certifying personnel in water pollution control facilities has a history of more than 50 years in the United States, dating back to the first program which began in New Jersey near the end of World War I. Presently there are 47 operating certification programs in 47 states, and two new certification programs just being implemented. The remaining state also is reported to be close to starting its operator certification program. Thirty-five of the existing programs are considered to be mandatory in that certification is backed by law in the form of legislative act or a state agency regulation.

A large majority of mandatory certification programs for wastewater facility personnel has been established during the past few years. The support of the Water Pollution Control Federation and its Member Associations have been key elements in this sequence of events. A 1966 model law—drafted and recommended by the Federation, the American Water Works Association (AWWA), and the Conference of State Sanitary Engineers (CSSE)—played an important role in rapid state acceptance of this concept. Most subsequent laws enacted have used this model law as a base, with each state making its own adjustments according to political realities, and there has been wide diversity in developing individual programs. A somewhat stronger model law was recommended in 1972 by the Council of State Governments, following an initiative from the EPA.

During the course of the FWPCA grant to WPCF (mentioned above), it became apparent that efforts could and should be diverted from selling the principle of certification to delivering the promised benefits by making the programs work. The move to form an association of certification programs was one step in this direction. There was also growing recognition of the need for standards or guidelines to assist the state certification programs in reducing their widespread diversity, and to avoid the needless duplication of their seeking separate solutions to similar problems. In early 1972 the Manpower Development Staff of the EPA agreed to support, and the Federation agreed to conduct, a study for the purpose of developing these guidelines.

Approach

The project has been aimed to study existing state certification programs and to prepare a guide setting forth the major elements which should be included in such programs. The appropriate relationship between state and

federal programs was also considered.

The scope of this project was limited to water pollution control facilities. It is recognized that in most states wastewater operators certification programs are conducted in close cooperation with waterworks programs and frequently are administered jointly. The fact that this report does not cover waterworks certification programs should not be taken as support for separate certification boards. On the contrary, the approach contained in the 1966 and 1972 model laws is favored wherein a single certification board is responsible for separate water and wastewater certification programs.

Six months have been spent in collecting information nationwide on state wastewater certification programs in order to develop this report. An intensive examination of the programs in six states, selected as representative, was undertaken by personal visits of the project consultant. In addition to the viewpoint of the certification "establishment" concerning the strengths and weaknesses of their own programs, an effort was made to solicit opinions of the program's effectiveness from others in the water pollution control field. Interviews were conducted with other state agencies, with federal agencies having water pollution control responsibilities, with local governments, with industrial officials, and, most important, with the operators themselves. The objective was to understand what each individual program is attempting to accomplish and the extent to which it is succeeding. The results of these six state surveys are reported in Appendix A.

Additional details concerning existing programs in all states were made available from the 1971 state certification program survey conducted jointly by WPCF, AWWA, and the "Joint AWWA-WPCF Ad Hoc Committee To Form an Association of Boards of Certification." (A detailed report on this survey was published in the December 1972 volumes of the JOURNAL WATER POLLUTION CONTROL FEDERATION and the JOURNAL AMERICAN WATER WORKS ASSOCIATION.)

As understanding has increased of the national certification picture, certain aspects of certification programs were highlighted along with the key questions which concern certification authorities. To insure an accurate picture of the national situation concerning the key items identified in the six states, a two-page questionniare was mailed in September to the 44 states not personally visited. A very gratifying prompt response was received from 35 states, further clarifying the comprehension of the situation as it now exists. Tabulation of these responses from the total of 41 states visited or surveyed by mail is shown in Table I, Section V.

The tentative conclusions were presented and discussed at the Operator Training Workshop held in conjunction with the 45th Annual WPCF Conference at Atlanta, Georgia. Afterwards a draft report, including the proposed State Certification Program Guide, was submitted to review committees of the WPCF Personnel Advancement Committee and the Association of Boards of Certification. Following receipt of their comments, the final report was prepared.

SECTION V - FINDINGS AND CONCLUSIONS

The general status of state certification programs for personnel in wastewater facilities is favorable. There is a strong momentum toward mandatory programs throughout the country which at least partly reflects a public decision that clean water is a necessity, not an option. There has been substantial and growing acceptance of the principle that certification of operations personnel is an appropriate legal mechanism to insure proper operation of the water pollution control facilities in which this nation is now investing heavily.

Owners of water pollution control facilities, public or private, were frequently early opponents of mandatory certification but in many cases have come to see the advantages to them. Certification provides a selection process that gives the owner confidence in his employee. Interest in higher certification serves as a ready measure of employee initiative. Programs have been stimulated in public utilities by federal regulations suggesting that federal funds may be withheld if certified operators are not employed at plants utilizing federal construction grants.

Operations personnel themselves, after some initial reluctance, have provided the greatest reservoir of support for certification programs. The program administrator frequently has played the key role in determining this rate of acceptance. Operators have generally recognized the beneficial impetus to raising their own technical abilities. Above all, forcing owners to recognize their qualifications and their responsibility to the public has come as an additional lift to the status of operations personnel. In some states there are now automatic salary increases associated with certificate grades. Where reciprocity exists between adjoining states, and a salary differential existed, the lower state salaries have been brought upward due to the hiring of certified personnel from across the state border.

Having accepted the principle of certification, we must turn our attention to its implementation. Here the evidence is less clear. Existing mandatory certification programs vary in age from a few months to more than 50 years. As will be shown, they also vary in quality from good to poor, and they vary on just about every other scale with which one might measure them. There are no two programs alike, because each program has begun and developed largely independent of either influence or information from outside the state. This extreme diversity has become a significant weakness and has been complicated by inadequate communications among certification programs. The combination of problems led directly to the formation of the Association of Boards of Certification (ABC). The twin goals of ABC, improved communications and reduced diversity, are extremely important elements in any efforts to strengthen state certification programs.

Model Law

One major obstacle to any attempt at reduced diversity is the differences between the legal instruments upon which different state programs are based. The AWWA-WPCF-CSSE model law of 1966 was very effective in promoting the concept but each state determined the details of its own law. Indeed, many of the current problems in certification today would have been averted if the recommended policies and procedures in that document had been followed more faithfully.

Today there is a new, improved model law, sponsored by the Council of State Governments (CSG), developed from an initiative of the Environmental Protection Agency assisted by the WPCF. As a result, the proposals made at the National Symposium on State Environmental Legislature held March 15-18, 1972, was accepted by the CSG committee in May. This document was described and reprinted in the WPCF JOURNAL October 1972, and is attached to this report as Appendix B. The revision of the earlier model retains many valid recommendations which have not been sufficiently implemented in many state programs, and which are reiterated once again throughout this report. Hopefully the backing of the CSG will assist in obtaining acceptance of the complete package by state legislatures. The ABC is expected to encourage such movement toward a uniform legal foundation for state certification programs, either through endorsing the CSG model law or by quickly developing a new model law of their own.

One major improvement in the new model law is the inclusion of a wider range of facilities. Broadening the coverage of existing programs is a necessity if the certification mechanism is to achieve its goals. The certification program should cover all water pollution control facilities in the state. In some states the compromises necessary to enact a law have resulted in the requirement affecting only a minority of facilities. Many states exclude facilities below a certain size. Many states exclude all industrial facilities. Some states exclude state-owned facilities. Almost all states are unnecessarily timid in dealing with federal facilities. It is suggested that insufficient advantage has been taken of the public support available to back these programs. If mandatory certification is an accepted link in the legal battle to protect and reclaim our water resources, then there is no excuse for exclusion of any facility which may have significant impact on the environment. A problem is recognized where facilities are extremely small or remote, employing only part-time personnel. For these facilities, numerous states are utilizing the option of a consulting operator serving more than one facility.

A severe complication in the system is added by the certification of personnel in industrial waste treatment facilities. The recent ABC survey of certification programs reported 22 states which require certification of such personnel and 18 (including some mandatory states) which offer such certification. There is considerable disagreement as to whether or not personnel in industrial waste facilities can or should be certified under an identical procedure with personnel in facilities receiving almost exclusively domestic waste. To report more accurately the views and practices of state certification authorities on this and other key certification program issues, a mail survey was conducted of the 44 states which were not visited during this project. Almost all states responded and the survey results nationwide are given in Table I.

TABLE I

"Certification Practices and Viewpoints in 41 States" *Questions*	States with Vol. Prog. YES	States with Vol. Prog. NO	States with Mand. Prog. YES	States with Mand. Prog. NO	All States Responding YES	All States Responding NO
Is your roster of certified operators kept current?	13	1	22	4	35	5
How? Annual renewal	6		11		17	
Other renewal term	7		6		13	
Other method	1		5		6	
How is your certification program supported? (Check one or more)						
State agency budget	4		20		24	
Renewal fees	10		9		19	
WPCF Member Assn. subsidy	1		1		2	
Other	5		2		7	
Is there a formal connection between training and certification programs?	9	6	18	8	27	14
Are training and certification programs with the same state agency?	6	7	19	7	25	14
..... with the same branch?	5	3	16	9	21	12
..... with the same individuals?	4	5	11	14	15	19
Does certificate renewal require participation in training?	3	11	6	19	9	30
..... require that the certificant remain employed in the operations field?	5	8	10	14	15	22
..... any other requirement besides payment of fees?	3	10	7	14	10	24
Is experience required for certification?	14	1	25	1	39	2
Can education/training serve as a partial substitute for experience?	14	1	23	3	37	4
..... serve as a total substitute for experience?	1	12	2	24	3	36
Does your program include certification of industrial wastewater treatment plant operators?	11	4	13	13	24	17
If so, (a) Are industrial and municipal operators in the same classifications?	10	1	7	5	17	6
(b) Are industrial and municipal operators given the same exams?	9	1	9	4	18	5
In your opinion, is it desirable to have separate certification exams and classifications for industrial wastewater plant operators?	10	5	16	9	26	14
Does any other agency or organization in your state have certification responsibilities for municipal or industrial wastewater personnel?	2	13	1	25	3	38
Do Labor Union activities affect your certification program?	0	14	5	21	5	35
Do Civil Service requirements affect your certification program?	4	9	7	16	13	25
Do you believe your certification program, as now functioning: makes it difficult for unqualified individuals to become certified?	12	3	20	3	32	6
makes if difficult for qualified new entrants to become certified?	0	13	0	23	0	36
raises the qualifications of those already in the field?	15	0	21	2	36	2
What % pass of those taking your lowest level certification exams?	100% high 25% low 80% med.		100% high 40% low 63% med.		100% high 25% low 65% med.	
..... your highest level exams?	80% high 10% low 57% med.		85% high 15% low 62% med.		85% high 10% low 60% med.	

Table I continued

QUESTIONS FOR MANDATORY PROGRAMS ONLY

	YES	NO
Is the facility owner responsible for meeting certification requirements?	25	1
Is any one plant required to have more than one certified operator?	14	12
..... more than one certified operator per shift?	4	19
Is there a legal penalty if a plant fails to meet the requirements for certified operators?	22	4
..... If so, has this penalty ever been imposed?	3	19
Do you have records as to the number of certified operators required at each plant?	16	9
Do you have records, by plant, as to which plants meet their legal requirements for certified operators?	20	4
Are records above maintained current?	17	3
Is there provision for revoking an operator's certificate?	26	0
If so, does revocation require a hearing?	24	2
Has a certificate ever been revoked?	2	24

There is a parallel in the contrasts between municipal water and wastewater operations personnel and the contrasts between municipal and industrial wastewater personnel. In many states a single board effectively administers separate certification programs today for water and municipal wastewater facilities. A separate industrial wastes program under the same board is already operational in a few states and could be added easily in others. It is interesting that the operator certification program of the U. S. Air Force Logistics Command has three distinct categories, one each for industrial wastes, domestic wastes, and combined wastes. This is a possibility for state programs.

In view of the inherent relationship between water, wastewater and industrial wastes, and the likelihood of personnel transfers between facilities, all three certification programs should be compatible and administered by the same authority. It is suggested that separate certificates for domestic and industrial waste facilities may be the only way to develop an adequate certification procedure for industrial wastes facility personnel. The present practice, in some states, of attempting to cover industrial facilities by merely requiring the industrial plant operator to take an exam tailored for municipal plants is not an adequate answer to the problem.

Separate certification for collection systems is also developing support. The new model law covers all wastewater "facilities" which is an expansion from the coverage of only wastewater treatment plants. The old model law included a separate certification program for water distribution systems.

No state government today can justify exempting state utilities from the law requiring competent operations personnel. However, this is a hard point to be argued by a lower-level state agency employee. The establishment of more independent state certification programs would increase their ability to deal with state-owned facilities.

The existence of Executive Order No. 11507 (February 4, 1970) has significantly strengthened the hands of state certification authorities in their dealings with federal agencies. This Presidential order calls for the operators of federal wastewater treatment facilities, where feasible, to meet certification requirements of the states in which they are located. The moral force of such a document is considerable, combined with the current wave of public support for water pollution control. The fact that some state agencies were found to be unaware of the President's order is indicative of the existing poor communications and overworked condition of operator certification personnel. In addition, there is not a more appropriate place for EPA authority to back up state programs than in dealing with recalcitrant federal agencies or installations.

Vocation

Certification programs should be broadened in their coverage of positions within water pollution control facilities as well as sizes and types of facilities covered. The practice of certifying only the individual "in responsible charge" has been a useful stepping stone toward a comprehensive certification process, but it is not to be considered the ultimate. It is recommended that the individual in charge, on site, at any given time, should possess the competence identified by an operator's certificate. This is a minimum. In large facilities which employ many key individuals, there obviously is a need for more than one person with certification quality.

Some have suggested—and some state programs currently aim at—the ideal, where every individual whose actions or decisions can affect the quality of the plant effluent must have an operator's certificate of qualification. The certification process must serve not only as a legally enforceable mechanism to protect the public interest, but also must describe a vocation. Current practice in the field of certification indicates that there is either one certification grade which covers all members of the vocation or there is a series of grades which provides a career ladder by which an individual may progress by steps.

State certification programs for professional engineers are examples of the first category, wherein a single license

covers all members of the vocation at all levels of legal practice. The federal program which certifies merchant marine engineers is an example of a multiple-grade program. Another example of the latter system is that of airplane pilots. It is interesting that the unions have played a strong role in both federal programs mentioned. This influence has also been felt in some state programs for the licensing of plumbers.

The water pollution control certification program should define the vocation that relates to the art and science of processing wastewater, including its collection, treatment, disposal and/or re-use. Those who are certified should be those with a potential to progress up the career ladder encompassed by the certification program. Different grades of wastewater operator certification are already established, in most states, primarily on the basis of the different levels of qualifications required for "responsible charge" of different sizes and types of facilities. However, in order to insure adequately the satisfactory operation of medium and large facilities, all operators whose action or decision can affect the quality of the plant effluent must be competent. This means that members of this vocation (somewhat inadequately described here as water pollution control facilities operations and management) should be certified by the state.

Expansion of the program should not mean abandoning the enforcement tool of certification for the individual "in responsible charge." It is logical to assume that the grade of certificate required for the man in charge should be higher than the grade required for those without this complete a responsibility. Regardless of how many individuals in a facility are certified, and at what level, the man in charge of the plant is still the man "in responsible charge" and his certificate should be forfeit if he fails in this responsibility. A logical extension of this principle is at least a certification requirement for the individual on site/in charge at all times.

Classification Relates to Qualifications

Classification is a key element of certification programs. Greater uniformity among certification programs will necessitate a uniform classification system for facilities. An attempt toward this was made by the 1966 model law sponsored by AWWA, WPCF and CSSE. The classification of plants simply on the basis of population served has been considered inadequate by a number of states. This conclusion has led several states to develop a point system which takes into account the plant size, complexity, and the various process elements within the facility. Such a point system reflects more accurately the difference in qualifications required for operations personnel at different plants. However, it is essential that the same system be accepted by all or most state certification programs, rather than each state developing its own.

The Association of Boards of Certification considers classification problems as its first priority. While this national effort is in progress it is suggested that new programs should follow the classification guidelines outlined in the 1966 and 1972 model laws, recognizing this to be an interim measure. The facility classification problem may be addressed at first only for municipal facilities, but the more complicated problem of industrial wastes treatment facility classification must also be solved. A nationally accepted classification guide is needed badly for both categories.

The classification of various level certificates for personnel is equally central to the entire certification process. Past practices have been inadequate as shown by the tendency of each state which adopts a new program to attempt independently the development of its own unique operator grades. The absence of adequate information to enable development of guidelines as to what constitutes a competent operator at each level makes this problem very difficult to solve. Modern principles of task analysis and industrial efficiency must be applied in the water pollution control field.

A pragmatic approach to this analytical problem was recently reported in the paper "A New Concept of Operator Wages" at the Atlanta Workshop on Operator Training. This paper was published in the February 1973 issue of the *Journal Water Pollution Control Federation*. The EPA-financed, task analysis-based study at Iowa State, concerning the staffing of small wastewater facilities, provides an important step in the development of basic information which is vital to future certification and training programs. It is important that expanded analytical efforts be implemented rapidly to provide the answers for a broader range of water pollution control facilities and on a national basis. Until we identify essential characteristics of, and qualifications for, competent operations personnel in water pollution control facilities, most of our certification and training efforts will necessarily be seriously impaired.

Utilizing the task analysis data, and taking into account the increasing level of responsibility which accompanies responsible charge of the increasing requirement for classifications of facilities, it will be possible to develop a logical procession of certificates which describe a career ladder. An example of such logical progression might be as follows:

a) Operator-in-training (entry level)
b) Operator
c) Class I plant superintendent/operator foreman
d) Class II plant superintendent/chief operator
e) Class III plant superintendent
f) Class IV plant superintendent

There are, of course, several approaches to this problem which should be considered in any project to study personnel classifications. One essential ingredient is that it must include a career ladder for those in the field. It should be oriented toward management and supervision, and it should encompass those jobs which could logically lead to facilities management or supervision. In this way various trades employed within a facility can be involved with certification no more than necessary; thus, possible future conflicts with labor can be avoided.

Only when there is a nationally accepted classification system for operations personnel and facilities will reciprocity between state certification programs become widely practiced. The study of state programs indicates that at

present there are several bilateral, reciprocity agreements. Reports are mixed as to the current demand from certified operators for a certificate in another state. However, the operators do not question the need for reciprocity. The ability to obtain a similar certificate in another state when needed is considered necessary for profession viability. Needless to say, differences between various state classification systems currently does a disservice to the individuals certified.

When certification program changes take place, some personnel have escaped the stringent new requirements, traditionally under a so-called "grandfather clause." This practice can be very useful in providing an equitable solution to the problem of older employees who may be incapable of meeting new and higher requirements for their jobs. There are both moral and legal considerations in taking away a man's job by a severe escallation in the requirements to hold it. Unfortunately, however, some "grandfather clauses" have gone beyond this admirable purpose to provide a permanent mechanism for certification of personnel by experience only, without a written examination, resulting in a weakened program.

It is considered that the exceptions allowed for in "grandfather clauses" are both necessary and desirable when major alterations are made in the certification requirements. However, such exceptions should be restricted to those individuals employed in the field at the time of the change and should only permit them to retain their current job for the one employer at that facility. In some states this is practiced and labeled a "no grade" certificate. The "grandfather clause" should not offer the same certificate earned by a man who passed the exam applicable at all like facilities in the state. Under no circumstances should exceptions be available as an alternate certification path for new entrants after the requirement change takes place.

Renewal

It is well known that the public demand for clean water and better water pollution control facilities has increased rapidly in the past several years. Obviously the facilities are becoming more complex, utilizing higher technology, and demanding greater knowledge and ability from those responsible for performance of the improved facilities. In an era of rapidly changing technology it is unreasonable to expect a single examination to demonstrate an individual's permanent competence in wastewater operations for the rest of his life. This is especially true of the relatively simple state exams of the past and present. Some type of renewal and some type of renewal requirements are needed.

At the same time, the state should not continually threaten to take away a man's livelihood by forcing recertification (taking and passing the current examination) year after year with higher requirements. A balanced method between a permanent certificate and annual recertification is suggested. There are several examples to follow, including public school teachers and commercial transport pilots. To ensure continued competence in their changing fields their certificate renewal requirements include (a) minimum activity in the field, and (b) minimum continuing education.

It is suggested that recertification should *not* be required as such. Annual renewal of a certificate should be an automatic procedure *provided that*, over the previous three years, the certificate holder has (a) devoted at least 20% of his time to facility operations and (b) attended at least 24 hours of a continuing education program approved by the certification board. The definition of an acceptable program would be contingent upon the training available within that state. The information on which to base such a renewal program can be furnished by the certificant, along with the fee, when he applies for renewal each year. It is considered that renewal requirements of operation activity and minimum annual training will have the very valuable by-product of gradually improving the ability of those now certified in the field, while at the same time not excessively burdening them.

There is much to favor a requirement for continuing education. However, it does require that within a state the necessary training capability must exist and sufficient training programs made available to meet these needs, if it is to be included as a part of the certification requirements. This presents a challenge to state agencies, educational institutions and WPCF Member Associations. A training program of this magnitude might require a cadre of full time instructors throughout the state. An inherent side-benefit would be an increase of operators' interest in new developments, and an end to many of the weak points that show up in plant operations.

Training

Federal support and incentives can accelerate the implementation of widespread training programs to upgrade the abilities of currently employed personnel. It is important that, in such an endeavor, the existing expertise is appropriately utilized. Independent federal training efforts are most appropriate at the entry level, thereby furnishing a pool of personnel and instructors capable of supplying the demand. Ultimately high schools and vocational schools should take over the entry level training programs. The goal of trained operations personnel must be kept in mind. The purpose is not to train more designers, and the courses must emphasize practical application for operators.

The relationship between training and certification is currently so intertwined that most state certification programs are the responsibility of the same state agency branch which handles state training programs, and almost half of the states report that these efforts are run by the same individual. This has resulted in close coordination of the two activities. Since many state water pollution control certification activities have had to operate on a limited budget, this combination has proved to be the most efficient way to make do under this restraint.

Unfortunately, however, there may be a conflict of interest in such situations which makes it difficult to pursue effectively either program. There is, for example, a natural tendency to direct the training solely toward answering certification exam questions. Furthermore, there is a natural inclination to consider the pass-fail rate on the certification exams as a measurement of the efficacy of the training programs. In the extreme, certification may be viewed as merely a tool to ensure that training classes are attended. To be most effective, the certification program

should be independent of the training program and minimize this conflict. The best coordination of these activities would exist where an official of the certification program serves as one member of an advisory committee for the state training program. Thus, changes in one program can be reflected with rapid adjustments in the other.

Autonomy

The independence of the certification program is a sensitive subject in instances where there has been an internal conflict for control of the water pollution control program; yet relative independence is crucial to the success of the program. It will not suffice for the certification program to remain, as it is in some states, as a minor branch of some state agency—competing constantly for a slice of the, perhaps already inadequate, department budget and supported externally by a powerless advisory committee.

It is proposed that if the program possesses relative autonomy and its own funds, the exact location matters little. Depending on local conditions, a state health department, state environmental agency, or state licensing agency suffices. The host agency can subsidize the operation through unbilled overhead, such as rent and computer time. With such a subsidy, reasonable examination fees and renewal fees can make the certification program self-supporting, providing adequate revenue for allocated staff time, board member expenses, and participation in ABC.

It is also desirable to earmark the certification funds. This provides an incentive to those responsible for the program to see that all fees are properly assessed and collected. It also removes the temptation to divert certification money to an urgent program elsewhere in the department. If supplemental departmental funds are necessary, the fact that the board is partially self-supporting makes it possible to get by with a smaller amount of the budgeted state funds. However, the renewal fee is considered the key to adequate program independence, adding another reason for this practice. To make the case of annual renewals even stronger, this activity can be used to maintain an up-to-date mailing list of certified operators. Without renewals, this basic certification function becomes complex with dubious accuracy.

The administration of certification programs has varied almost as widely as the rules and regulations. However, many programs have overcome very significant obstacles simply by the additional effort put forward by the certification personnel. Programs have basically succeeded because of professional dedication. Such efforts have overcome tremendous obstacles and serious weaknesses in the underlying authority to push the program forward into a productive phase.

Study results also indicate that unpaid appointees have carried a massive burden in most state programs. These individuals, sometimes appointed by the governor or sometimes by the department head or bureau chief, frequently are required to take weeks from their paying jobs to administer the certification program through a critical stage.

In most cases it is apparent that the program has benefited from the diversity of backgrounds among the board members. One of the strongest elements in existing certification programs has been the practice of multiple representation, frequently including operations personnel, facility owners, appropriate state agencies, and an educator/trainer. It is essential that certified personnel participate actively with the board if they are to believe in and support the program. Likewise public or private (industrial) facility owners will accept their responsibilities more readily if they are represented. The practice should continue to deny control of this program to any single interest. This caution includes avoiding the temptation to allow an educator board member to do all the work. It is clearly in the best public interest and necessary for an effective and realistic program that contributions be made by all. The effectiveness of certification will suffer in the long run where any single interest group dominates the administration and operation of the program.

Qualification Relates to Classification

Present practices in the administration of state certification programs reveal several problem areas. One is that concerning minimum qualifications in order to receive permission to take the examination. In some states, it is necessary *to be employed* in that position before permission to take an exam is given. This is considered an undesirable practice. Our review indicates that there is no justification for denying a certificate to an individual who meets the experience and educational requirements and can pass the examination. On the contrary, the incentives for individuals to improve their standing, and to provide a pool for filling higher level vacancies, offer ample reasons not to deny certification opportunities to those qualified.

There are indications that the minimum educational requirements have advanced too far ahead of the field. The 1971 ABC survey, sponsored by AWWA, WPCF and the "joint committee to form ABC," showed that no fewer than 17 wastewater certification programs (11 mandatory and 6 voluntary) require a college degree for their highest class operater. This is consistent with the suggested regulations which accompany both the 1966 and 1972 model laws, but it is, in retrospect, seemingly unrealistic at the present time. It is essential that the model law "guidelines for operator qualifications" be understood and applied as a complete section, emphasizing the interchangeability of experience and education requirements. At this time, application of the minimum educational requirements in the higher grades would be unfair unless the substitution principle can be applied. Realistically, at this time, high school should be the only absolute minimum educational requirement, but there should be absolute minimum experience requirements. Taken as a whole, the model law section on operator qualifications remains an ideal description, with the understanding that the stated minimum educational requirements are targets for the future and are not firm restrictions currently applied.

The tendency in this field has been to upgrade operator qualifications by moving toward the description of a "sanitary engineer." Although there are sanitary engineers

who are quite competent in the operation of major water pollution control facilities. it is not necessarily a fact that in order to possess such competence one must be, or possess the education of, a sanitary engineer. Over-emphasis on this field of knowledge, either by educational requirements or by exam questions, conceivably could have a detrimental effect by denying certification to non-engineers who might meet easily the requirements of the operations position.

Similarly, it is suggested that the practice of automatically giving a certificate to a professional engineer, or to anyone else, must be eliminated. The competent designer of an airplane is not automatically given a pilot's license, and the same logic holds with water pollution control facilities. As is suggested in the model law regulations, additional education can serve as only a partial substitute for experience, which is the single *sine qua non* in operator qualifications. In a similar vein, the value of certification should not be watered down by the practice of awarding honorary certificates, unless it is clear that the "honorary certificate" does not include the legal sanction to hold an operations position.

Examinations

Most states now require a written application and a written exam. The first is a necessary requirement which puts the applicant on record as to the qualifications he claims; the second is the most unbiased method by which to determine competency according to statewide or perhaps nationwide norms. It is suggested that both should be basic requirements.

A problem does exist where experienced, poorly educated but competent operators are simply unable to cope with a written exam. This is being handled under the "grandfather clause" and should disappear, along with the grandfather clause, shortly after a new certification program takes full effect. In the interim there is the effective South Carolina practice of offering an oral examination only to an individual who has completed the specified training courses and has tried and failed the exam twice, and whose competence is testified by his employer.

The frequency of the examination is considered an independent factor and depends upon the type of examination that is given and the number of persons to be examined. If the examination is reused many times and if easy to grade, it is not too difficult to offer a large number of examinations. All that is necessary is to have a responsible individual to proctor them. On the other hand, if each examination has all new questions that have been carefully evaluated and developed for that particular examination, including selected essay questions, then the time required for either the certification board or the staff to grade them may be so great that the number of examinations must be limited. The convenience to the examinees must be considered when determining examination frequency and location.

There is much room for improvement in the field of certification examinations. Most state programs have developed their own certification exams, for all practical purposes by themselves or with the help of other states. The questions vary widely as to difficulty, clarity, and their relationship to the operation of facilities. There is a critical need for examination questions relevant to facility operation. In some cases, the same exam is given over and over again at random times and locations throughout the state. This is not conductive to accurate measurement of individual ability and knowledge, but has been necessitated by the extreme difficulty of preparing new examinations. A current WPCF project which is collecting questions for a study book should assist in identifying some of the present weaknesses and indicate the direction of remedial action.

In state after state the certification board members or an advisory committee have been required to spend considerable time in the preparation of their own state exam; therefore, they cannot afford to repeat the process every year. If two or more states could agree on the classification of certificates and on the qualifications for each class, there is no necessity for them to continue preparing separate examinations. A readymade opportunity exists for the ABC to offer, like other national associations of licensing bodies, a nationally prepared set of certification exams which can be used on one day by all participating states, and then discarded. Guidelines for such examinations and basic source material could potentially be by-products of the examinations study book project now being conducted by the Water Pollution Control Federation. A further burden could be lifted from the shoulders of small state certification programs in the future by offering an ABC service to grade the ABC sponsored exams. Grading, however, is a sensitive question and many states may prefer to grade their own.

Some states have attempted to publicize their programs, but most can do much more in this area. The practice should be instituted, if not already, to prepare news releases about those who successfully complete the requirements for a certificate. Such public relations activity will strengthen the certification program and will offer a badly needed boost to the individual employee by publicly recognizing his accomplishment. Results of the examination should be delivered first to the operator and then, if he passed, to his employer and to the press.

Each question that is used in an examination must be evaluated to determine its relevancy to the position for which the person is applying or being tested. It is recognized that this causes a great burden, particularly when each examination may have over one hundred questions and several levels of questions are being used. As an example, if each examination had one hundred questions and at four different levels, this would be four hundred different questions. For a volunteer board to evaluate each of these questions for relevancy is asking a great deal. Under present practice, the administrative agency usually attempts the evaluation or the education member of the board is handed the responsibility. A special review committee should be appointed consisting of qualified individuals that know the jobs and the problems in water pollution control facilities for this purpose.

After each examination the pass/fail rates should be carefully reviewed by the board. If less than 50% pass the examination, it would be well to review the training that is available for that level as well as the type of questions being asked on the examination. This should give some indication as to the relevancy of both the training and the examination.

Before any grading "curve" is used, the significance of the persons failing to meet the established minimum grade level should be very carefully reviewed. Proper handling of an examination in all its phases is essential if a certification program is to be meaningful. If employers will make available information on the type of personnel needed in a particular water pollution control facility, the examination and training can be tailored using task analysis to meet the skills required, and certification will become more meaningful and will be greatly strengthened. Specialists are available to assist in the field of examination preparation and grading, and their expertise should be used in this field.

Enforcement

The ultimate test of the certification program is enforcement. Although revocation is a necessary part of the authority for any mandatory program, only two states report that they have ever revoked a certificate. Likewise, only two states report that they have ever imposed a penalty on the owner for failing to comply with the legal requirements for certified operations personnel. Due to insufficient staff, some states do not know whether the facilities are actually in or out of compliance. This discovery seriously questions the effectiveness of certification programs in general.

Adequate staff time must be devoted to insuring that owners of water pollution control facilities meet their responsibilities under the certification law. One of the arguments for the locating of the certification program in the state water pollution control agency is to facilitate the processing of plant operating reports through the certification office. In this way, changes in staff or staffing requirements may be identified quickly and action taken accordingly.

When a violation of law is found, following due process, violators should be penalized and the violation and penalty should be publicized. Certification laws do not allow for the coddling of incompetent personnel. The public will support the certification program far more and will appreciate the abilities of the certified individuals far more if it recognizes that water pollution control personnel can lose their state certificate if they fail to perform adequately. In order to merit such public respect, revocation must be practiced.

The study indicates that the basic format of certification programs for wastewater personnel compares favorably with others. Although certification of operations personnel in this field has yet to be fully implemented (only seven mandatory programs are more than six years old), the progress has been impressive. Unlike licensing programs for plumbers (state) and merchant marine engineers (federal) there has been no hint of a "closed shop" approach. The states are rapidly expanding their programs' abilities to meet the certification needs of other than municipal water pollution control facilities. The state programs themselves are moving, through the ABC, to reduce their diversity and strengthen their effectiveness. Accordingly, any move toward federal certification at this time would be counterproductive of water pollution control goals. EPA's continuing support for state certification programs is recognized and is appreciated by the programs.

There is, however, insufficient recognition of wastewater certification programs in other state and federal agencies which should have an interest. A massive campaign may be necessary to alert selected federal installations to the existence of state certification and to the requirement, under Executive Order No. 11507, that they provide certified personnel for their facilities. Also, state and local Civil Service Commissions will require education concerning our program. For example, an appropriate certificate requirement should be written into the job qualifications under Civil Service.

Also, due to their powerful influence on job descriptions, Civil Service Commissions must be kept up-to-date as staffing determinations become available and accepted, the conflicts between classifications in certification and classification in Civil Service can be avoided if sufficient time and effort are devoted to this potential problem.

The efforts of the EPA to stimulate adequate manpower planning at federal, state and local levels is beginning to fill a serious void in the water pollution control field. This program is directly related to certification and training efforts. It should be used to provide information and support to state training programs. To avoid chaos, it is essential that the same or similar occupational definitions, job descriptions, classifications, and staffing guides be accepted by planners, training programs, certification authorities, and utilities management. Accordingly, the temptation to leave planning behind should be resisted and, despite the extra time required, the advances being made in planning, training, and certification programs should be widely communicated among federal and non-federal organizations. It is suggested that many federal efforts can benefit by building on the knowledge and experience of ongoing (but under-financed) similar programs over the past several decades.

Water Pollution Control Federation

Both the federal government and the states should be aware of and take advantage of certain ongoing activities of the Water Pollution Control Federation which relate to certification. Examples of such activity include:

Deeds and Data—This is an established educational periodical of the WPCF MANFORCE program which is reaching, in increasing numbers, those who may seek certification as well as certification authority officials. Its use as a vehicle of communications relative to certification programs and related developments or reports can be extremely helpful to federal and state agencies as well as ABC.

Operator Training Workshop—This activity is planned to be an annual function of the WPCF MANFORCE program. It can provide, as it did at Atlanta, Ga., in October 1972, a most appropriate forum for the consideration of special problems related to certification.

Operator Definition, Image and Wages—The direction of WPCF efforts concerning image and wages of operations personnel has changed with the formal organization of ABC. Previously the emphasis had been directed toward stimulating and encouraging certification as a first step. ABC, with the continuing support of WPCF, should now bear the primary responsibility for promoting the adoption and improvement of such programs. The efforts of the

WPCF should be re-oriented to a more direct attack on these problems. Examples for further expansion are typical salary articles in the August, September and October issues of *Deeds and Data* and the paper "A New Concept of Operator Wages" presented at the Atlanta Operation Training Workshop. The latter effort is understood to be expanded in the immediate future to a regional study (Illinois, Wisconsin and Minnesota), and subsequently conducted in other regions. The WPCF MANFORCE program has produced a set of Career Development Charts, with accompanying narrative, for the purpose of defining the "operator" as viewed by WPCF. Following committee review this work is expected to be published in *Deeds and Data*. The charts are understood to represent a suggested professional career ladder and should prove useful as guides in personnel classification and establishing certification grades. Further, they are understood to suggest which agencies, institutions, and organizations might most appropriately provide training at which levels of career development. The production of such information, such as guides, by WPCF was strongly urged by the Atlanta Workshop Conference.

WPCF Certification Study Books—In the development of these books (three are anticipated) the certification examinations of approximately 30 states were gathered and screened. The screening process involved the classification of questions by unit process subject area and within each of these the area of skill or knowledge being examined. The questions are being evaluated as "acceptable" or "unacceptable" and where possible unacceptable questions are being rewritten. Finally they are to be classified as to certification grade. It is understood that this final step will be coordinated with the ABC. In addition to producing study material, the developmental process will provide a comprehensive evaluation of current examinations. It is expected that this will provide a basis for the ABC to suggest guidelines for improvements in the examinations.

Changes

In view of the fact that the practice of water pollution control and the practice of operator certification were both established decades or generations ago, one must be constantly aware that on-going certification programs exist now—with important relationships to living human beings. This means that any alterations proposed must take into account the impact on the people involved. It also means that a wealth of knowledge and experience exists to handle change. Any effort to impose change on existing programs must take into consideration the existing system, and the exceptions which must be accommodated.

Understanding the impact of change leads us to the recognition that different states are presently at widely differing levels in their path toward an optimum certification program. While there are many problems in common, each state has its own peculiar obstacles to overcome. A flexible approach is highly desirable, yet hard to implement, allowing the program to move forward in several aspects at one time, although perhaps delaying a particular improvement which will ultimately be necessary. We consider that new certification programs face the greatest problems, but they also have the best opportunities to avoid the pitfalls and dead ends which have hampered the efficiency of some older programs. To plan ahead it should be noted that any major change will require extra effort from the staff and board and additional expenditures for staff time and extra examinations.

State programs to certify operations personnel in water pollution control facilities provide a vital element in this country's program to protect and restore the quality of our valuable water resources. If applied properly, certification can assure the presence of qualified individuals operating the nation's multi-billion dollar investment in water pollution control facilities. At the same time, it can assist the individuals in this vocation to demonstrate the value of their abilities. In this way, both tangible and intangible recognition can be obtained from the public.

In summation, most states have one or more activities in their certification program that was found to be praiseworthy; however, no state program was found to lead to such an extent that it could not stand improvement. It is hoped that the information revealed in this report will contribute to advancing certification programs toward their goals.

APPENDIX A

"An Examination of Six State Certification Programs for Personnel in Wastewater Facilities"

Overview

During the summer of 1972, the state certification programs were studied in Minnesota, New York, Ohio, Oklahoma, Oregon and South Carolina. The principal part of the study was made with the direct participation of the person and agency responsible for the certification program in an effort to learn more about the program and its ramifications. Five of these states have "mandatory" certification. One state, Oregon, conducts a voluntary certification program. Various federal, state, and municipal officials, industry personnel and consultants were also interviewed.

The certification programs studied varied significantly. New York with a program that was adopted in 1930 and Ohio with a program begun in 1937 were among the early states to have mandatory certification. South Carolina's and Minnesota's certification programs are among the more recent, July 1971 and July 1972, respectively. Both originally had voluntary programs, which were superseded by mandatory programs. While Oklahoma had a voluntary program, which started in 1939, the first mandatory legislation in that state was passed in 1959. It is interesting to note that both New York and Ohio adopted their mandatory programs under authority granted to their Boards of Health to enact regulations. This authority has been extended in New York to the State Department of Environmental Conservation and is continued in Ohio with the Ohio Environmental Protection Agency creation in October of 1972.

Enforcement

The attitude toward enforcement of the certification requirements is the principal difference between states where mandatory certification has been adopted by departmental regulation as opposed to those states where mandatory certification has been adopted by legislative edict. There was no evidence that any certificates had ever been revoked in those states which required certification by regulation.

While two of the states studied have programs that are just now becoming effective, their attitude toward their capabilities to enforce the law would make it appear likely that their laws can and will be enforced. States that do not require renewal of the certificates after they are once issued have experienced difficulty revoking a certificate. Other states that renew a certificate periodically find it possible to enforce certification standards simply through the renewal mechanism. However, the study indicated that certification enforcement appears to be generally quite weak. There are other enforcement variances in the different states. In one state, which has a state subsidy program covering thirty-five percent of the operation costs in a local wastewater treatment facility, enforcement is attempted by withholding these funds until the community has certified operators and meets other requirements. In the smaller communities, these requirements and the employment of a certified operator may cost more than the thirty-five percent assistance received from the state, thus limiting the effectiveness of this approach.

In some states the individual is responsible for his own certification, and in other states the employer must ascertain that a properly certified operator is at the plant. The usual penalty in most states for a violation of this law is classified as a misdemeanor. Violations of the certification law are ordinarily picked up by field staff members of the state department or by certified persons that report known violations.

One superintendent interviewed reported that the manpower problems that he faced in his plant were, in order of significance, 1) Civil Service, 2) Political appointments, and 3) Unions. Certification, in his opinion, was so weak in his state that it had little effect upon those who were hired or fired. Yet, he himself carried a top level certificate.

Generally when a State Certification Authority was questioned concerning the certification of operators at federal installations, the opinion was that the state had no authority in these areas. Most certification program administrators had no knowledge of Executive Order No. 11507 (February 4, 1970), requiring that operators of federal government wastewater treatment plants meet certification requirements of the states in which they are located. It appeared that the state programs' involvement with certification at federal installations varied more with the person responsible for administering the certification program than from any lack of legislation.

In some states, the Corps of Engineers leased their recreational facilities to the state agency which is required to comply with all state and federal rules and regulations. In other areas, the federal agencies are endeavoring to develop their own qualified operators and certify them, with the intent that they will be meeting requirements at least as high as those established in the state where they are operating. However, there is presently no single review authority which passes on these certification actions developed by federal agencies.

The Air Force Logistics Command, with headquarters at Wright-Patterson AFB, Ohio, has established its own examination and certification program. It requires renewal every two years, and before renewal can be approved the person must have at least 16 hours of training. The Forest Service is making arrangements with the Environmental Protection Agency (EPA) to conduct classes for their wastewater plant operators in Atlanta, Ga., during the winter of 1972-73. It is reported that the Corps of Engineers plans training courses for their people at St. Louis, Mo. In Oklahoma, the Corps of Engineers' operators are certified after taking training provided by the State of Oklahoma.

In some cases, the state-owned wastewater facility operators are certified. In other cases, this is not true, particularly where penal institutions are involved and prisoners are responsible for the operation of the treatment facility.

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Administration

Certification program administration varies from state to state. Many states have certification boards appointed by the Governor. The board membership may be recommended by the association to the Governor, or the Governor may select any person that has the qualifications established for the board. In other cases, the certification board may be advisory to a board of health, an environmental agency, or to both agencies. Finally, the health or environmental agency may employ staff members to administer certification programs. Any changes which are desired may be obtained by asking for modifications in the rules and regulations from either the board or administrator in responsible charge of that agency. In one state, the certification boards for water and wastewater are separate, but they share the same secretary. In practically all cases where there is a board, there are representatives from the water industry, the wastewater industry, the educational community, and the agency responsible for the water and/or wastewater program. Others who also serve on these boards may be municipal officials, consulting engineers, and industrial personnel. Usually the members serve for staggered terms.

The certification board's degree of responsibility varies from state to state. Some boards are concerned only with wastewater operators, others with only water plant operators and others with only operators of industrial waste facilities. Many boards have all three of these responsibilities. In addition, one board certified personnel who ran soil percolation tests for septic tank drainfields; and there had been a movement to include water well drillers also.

More and more states are requiring certification of those persons that operate the wastewater collection system and associated lift station operation. It appears that this requirement is fairly new, and several certification program administrators would like to see this occupational category certified. Practically all boards adopt policies and regulations or, if they are advisory, recommended for adoption such policy and regulation matters to the parent agency.

Some certification boards have very little, while others have a great deal to do with the examination. This may include the review of the individual's application, the preparation and grading of the examination questions, and the actual administration of the program. One board has a subcommittee which includes only a few of its board members and several operators who take care of the preparation, administration and grading of the examination. Most boards retain the right to review the examination results and usually check those papers that are just above or just below the failing mark.

The board chairman and secretary usually sign the certificates. However in some instances, this may be done by the office manager and the head of a department, especially if there is no advisory or certification board.

In some instances, the board may concern itself with operator training programs or it may establish a special committee to coordinate operator training, since usually the educational institutions and other state departments are involved in training of personnel.

All states investigated employed a person to handle the day-to-day problems of certification. This person is known as an office manager, secretary to the board, or a member of the state's staff. If there is a certification board, he prepares various material for them and performs routine administrative duties. If there is no board, he will carry out the various duties mentioned above for the board. He will maintain lists of those who are certified. Some states utilize data processing. He will maintain plant listings with requirements for operation and see that the plants have qualified personnel employed. This function makes it necessary for him to participate in enforcement actions. This can involve formal hearings and contacting reported violators. The board itself usually conducts hearings and takes other legal action as deemed necessary.

The manager must handle all renewal and application fees. These fees are usually deposited in the state's general or earmarked funds. In either case when fees are collected, it is necessary to prepare receipts. Other duties include application review, sending out new certificates and renewing existing certificates. Frequently enforcement is obtained by refusing to renew a certificate to someone who appears to be a violator. Since several of the states studied do not provide for renewals and charge no fee, they must have other methods of enforcement.

Certification board administration problems are frequently found with an insufficient budget to carry out their many responsibilities in a proper manner. The person administering the certification program frequently has many other duties. In some cases, a single individual is so busy renewing applications, receiving money and trying to take care of the certification program, he has little time to effectively perform the many other duties that are connected with certification. In some instances, the person responsible for certification also conducts or administers the training program for the state. To keep track of staff changes, in some states, it was noted that all plant operating reports cross his desk. In states with a large number of municipalities and industries, this was not possible and data processing was necessary to provide this type of review.

In most states, the quality of the program is directly related to the enthusiasm and ability of the manager. As previously noted, the amount of time spent by the office manager on the certification program depends upon the number of applicants, whether or not the certificates are renewed periodically, whether there is money to be handled, and the type of examination involvement. Duties are minimized if there is no renewal, if there is only one examination per year, if the individual is charged only with issuing the certificates, if he has nothing to do with the examination or training, and if he does not have money responsibilities. The manager sometimes has the responsibility to ascertain that properly certified operators are employed at plants at the proper level. Also he may work with state-employed district engineers who report their findings to him.

Rules and Regulations

The states studied recognized the need for certification of operators at industrial wastewater treatment facilities. Yet, only a few of the state laws require certification of these

operators. The states generally indicated that the (blank) industry association usually opposed certification of operators; and in an effort to have certification legislation passed, industrial wastewater treatment facility operators were excluded from the legislation. In one instance, however, where the industrial waste operators were a part of the "association" which was sponsoring certification, the industry operator certification provisions were included, and they did not oppose its enactment.

In those states where certification is handled by regulation, it would seem relatively simple to require certification of the industrial waste plant operators. Yet, this was not the case. The general reason given for this situation was that the staff was so overloaded that they could not handle the additional work load. In some industries where industrial wastewater operators are apparently highly skilled, the wastes are different from those processed through most municipal plants. Other industries assign their most unqualified people to operate the waste treatment facility, risking serious pollution of the receiving water or serious overloading at the municipal wastewater plant.

The number and type of persons required to be certified at individual plants varies considerably from state to state. Some states require only the person in responsible charge of the plant be certified. Other states require the person in responsible charge and his principal assistants be certified. Others require certification of each person that may be in responsible charge of the plant at any time that the plant is in operation. This could mean the city engineer, the director of public works, the plant superintendent or manager, his assistant, each of the shift foremen and whoever may be filling these positions when the regularly appointed persons are absent. One of the states investigated required that all persons employed at the plant, including maintenance people, be certified.

Some states waive the certification requirements for prominent individuals working in the wastewater field and issue a certificate on an honorary basis. This privilege normally goes to persons such as college professors, consulting engineers, members of the State Health Department's staff or the environmental group staff. After these persons receive such certificates, they occasionally make themselves available as "consultant operators" for a fee. There they look after one or more of the smaller plants on a consultive basis, usually signing the laboratory test reports.

In order to establish the level of certification required at a given wastewater plant, it generally is the practice to classify the plant by determining the type of treatment and the volume of waste and/or the number of persons served. With this information the plant is classified and the level of operator certification required is established. Some states reviewed have established rating values for classifying their wastewater treatment facilities. Points are given based upon the complexity of each device in the treatment plant. These points may vary from one to ten. For example, ten point items include diffused aeration, heated sludge digestion, vacuum filters, sludge elutriation and sludge incinerators. There are points given based upon the amount of dilution of the treated effluent with good dilution, two points, and poor dilution, six points. Some recognition is given based upon the population served. With the total number of points determined, a plant is classified and the level of operator certification required at that plant determined.

In some cases noted, operation personnel were not classified in a realistic manner. Classification was not related in any way whatsoever to the job being done. The same is said of the examination questions.

The certification of wastewater plant operators in general has increased the operator's pride in his work by giving him a better understanding of his job and what is expected of him. This in turn has made for a better plant operation. For instance, those supervising wastewater plants learn quickly which operators intend to stay on the job and which are anxious to improve themselves by training and certification. Also, from the managerial viewpoint, when trained operators are employed, it is normally not necessary to maintain as close supervision over the plant employees as would be the case with less well-trained personnel.

The desirability is generally recognized of reciprocity agreements to permit certified operators to accept a position in another state where certification is also required. However, the extent to which reciprocity is actually practiced also appears to vary from state to state. In general, if a person—previously certified in another state—obtains a new position in a wastewater plant, he may apply for certification by reciprocity. Uusually, the Certification Board will review his application, his experience level, the type of training he has acquired, and the type of examination that he passed in the other state. His credentials are accepted at a level which they consider equivalent for their state. If there are questions concerning his qualifications, he may be required to take a special written or oral examination.

Operators believe that there is much merit to a program that permits them to move freely from one state to another after certification. However, present practice is so vague that there exists a fear that a move to an adjoining state might require new experience in addition to taking the necessary examination.

States in this study having mandatory certification initially had provisions for currently active operators to continue at the same plant when the law became effective under a "grandfather's clause." This practice has been given various labels but, in general, permits the person to continue to work at the plant where he was working before the certification requirements became mandatory. It does not permit him to move from one plant to another plant. Those states with the older programs generally have dispensed with the "grandfather clause" requirements when those personnel who were on the job in the beginning of the program, have completely "grandfathered in," retired, or died.

In New York State when the program was expanded to include those in charge of collection systems and the wastewater treatment operators in New York City, the "grandfather clause" was reinstated. In South Carolina, a person has been allowed to continue to work at a plant if he was working at the plant before the law became effective under a "no-grade" certificate. This is good only at that

plant and does not permit the person to be in responsible charge.

The basic qualifications for certification as a wastewater treatment plant operator are becoming more restrictive. At one time, it was only necessary to pass the examination; there was no education requirement. Some states today accept eighth grade education as qualification for the lower level positions, while most states are requiring at least a high school diploma or equivalency certificate. In addition to the educational requirement, one year of experience in the plant is generally required before a person can even take a lower level examination.

Some states are permitting the examination to be taken before the experience requirements have been completed but there is no certificate issued until the necessary experience has been obtained. State regulations recognize these people who have passed their examination but not yet completed their experience requirements, by classifying them as "trainees."

In one state, the individual, upon passing the examination, is given a letter stating that he has passed the examination and will receive a certificate at whatever level he may have been examined for, when his experience requirements have been completed. This letter is returned to the certification agency and exchanged for the proper certificate at the proper time. This method of handling the certificate has been advantageous to disadvantaged persons and persons recently discharged from the Armed Services. These individuals frequently have completed 3, 6, or even 24 months of special training, and are able to pass an examination, but lack experience.

The experience requirements generally increase as the level of certification increases. Usually after the person has one year of experience, additional training may be substituted for much of the additional experience requirements. Many boards will substitute training for experience on a day-to-day basis; others consider one year of college training equivalent to 2-1/2 years experience. The correspondence course developed at Sacramento State College has entitled trainees to receive experience equivalencies ranging from 4 to 12 months, depending upon the state.

Practically all states now require one year experience plus high school graduation, or an equivalency certificate for even the lowest level certificate. In some states those that graduate from a university in an engineering or biological science course may apply for the highest level certificate after one year's experience, while the person with only a high school diploma may be required to have as much as ten years additional experience to apply for the same certificate.

In practically all cases an examination must be written. However, in one state if a person has one year experience at a plant, and is a registered professional engineer or has graduated in the proper engineering or science course, he will be eligible for the top level certificate. In other states for a top level certificate, the person may be required to describe his plant's operation—what the plant is supposed to do and what it is actually doing—and in addition, indicate papers he has written, honors received or other information that would assist the certification board in evaluating his qualifications.

In some states, the top level certificate is issued only to the person in responsible charge of a large wastewater treatment facility. In a few states, the certification board will recognize working experience at the state department of health or the state environmental agency allowing such persons to be certified.

The "positions" requiring certified operators are differently interpreted in various stages. Many laws indicate that the "person in responsible charge" should be certified. In one state, the law requires that anyone who is working at the plant—operator, maintenance man, or the person in charge—be certified at the level required to operate that particular plant.

Recognizing the importance of experience, some states will only permit a person—who has already been classified at a high level—to take an examination for one step above his present level. Thus, if a person is operating a plant that requires a second-level type operator, he is only allowed to take an examination for a third-level classification when he has the experience in the third level classification; but he can not take an examination for a plant in the fourth level classification until he has gained experience by working at a plant requiring either a third or fourth level operator. This requirement has occurred because it was felt that a person can not obtain the proper experience at a lower level plant. As a corollary to this practice, in some states whenever a person takes an examination other than the beginning examination, he is given two examinations, one for the grade in which he is currently employed and another in the grade for which he is applying.

Examination

The main function of many certification boards is the preparation, conduct and grading of examinations. Unfortunately, many boards do not have the facilities to develop meaningful questions, and as a result, frequently gear their questions to an elementary level of sanitary engineering. Many boards are trying to make their examinations more realistic, but many examinations are still closer to what one would expect as part of a professional engineer's license examination rather than an examination for a wastewater plant operator.

Questions are obtained from many sources. Many states use modified questions developed from other state examinations. In other states, the college representative on the board or a knowledgeable member of the department's staff may prepare the examination. In some instances, the board members themselves submit or develop questions. One state examined had a committee to prepare the examinations. This particular committee includes two members of the certification board; other committees represent personnel in the water and wastewater industry, particularly operators. This type of group, if they are knowledgeable, can be of great assistance. Another excellent source of questions was found to be the instruction material that is used for training. This instruction material is usually geared to the level of operator being trained for a particular certification grade, and can supply many of the examination questions.

Frequently, the lower level examinations have been shown to cover material similar to that found at the higher level except that there are no difficult mathematical problems and chemical formulae. Also the papers may not be graded

as closely as they are at the higher levels. In some states when a suitable question has been developed, it will be used many times with possibly only a change in the numbers so as to provide for different conditions.

Frequently the examination is composed by the staff members or the university representative on the board. The board members may not see the examination until after it has been given and are only able to evaluate the questions by observing the examination results.

The time required to write an examination varies. For the simpler examinations, thirty minutes has been adequate. Some examinations require an entire day, but the average is about four hours. In some states, time limits have not been established. Although the average person may write an examination in two hours, many additional hours have been allowed to accomodate those who are somewhat slower.

The type of examination questions used varies with different boards. There are several types of questions that are used: true and false, multiple choice, completion, problems, and essay. There is a definite trend away from the problem and essay question, attributed to the time required for grading. With the essay questions, differences of opinion may occur between the person who is grading and the person who is writing the examination. The type of question found that is most favored is the multiple choice question, which does permit problem solving. While some boards will accept only a right or wrong answer, others will allow up to fifty percent credit when detail calculations are shown and the examinee has made only a mathematical error. The multiple choice questions are graded either by machine or by an examiner using a key. This permits, if desired, grading immediately upon the completion of the examination.

The administration or the proctoring of the examination was found to vary with different states. In many states, the board itself is available to proctor the examination. In other states, the board assigns a single person to proctor and administer the examination with the use of office staff; yet in other states, the examination is monitored by the secretary, office manager or administrator. If an examination is given in several areas of the state at the same time, different members of the board usually preside at each examination with assistance from central office staff, the local civil service department, or the regional engineers. In at least one instance, the regional engineers themselves administer the examination. In this instance the certification board or the office manager sends the regional engineer a sealed envelope containing an examination for each person to be examined. The regional engineer passes out the examination papers, recording the time the papers are passed out and returned. By doing this identical examinations can be given in several locations at the same time.

Several states also provide for oral examinations. These may be given to persons applying for a reciprocal certificate or for persons who have failed to pass the written examination after two or more times. When a person has failed two or more times, but his work, as observed at his plant, indicates that he is doing a satisfactory job, the operator's supervisor requests that he be given an oral examination. The oral examination in this case is ordinarily given by three or more board members. The oral examination is given on days other than when the regular written examination is offered.

The location and frequency for giving the examination was found to vary with each state. One state gives an examination annually at the same location in the state. Other states make the examination available at any time a person desires to take it, if he comes to the central office; otherwise, there are one or two examinations a week offered in different parts of the state. Some states were noted to periodically give the same examination at several localities in the state on the same day. Another offered many examinations at a high frequency but has recently decided that the staff could not handle this and has now provided for one examination a month at a different location each time. In this instance there is a public announcement giving the date, place, and time for each examination six months in advance.

Examination grading procedures also vary. In some states, the examination is graded immediately following the completion of the examination by those that are proctoring. In other states, several months elapse before the examination results are available. The examination questions may be graded by the board itself, the university professor that is connected with the board, or by the office staff. In some cases, the office staff has different individuals responsible for grading only one or two of the questions, in others the paper is graded by computer.

Ordinarily, the person grading does not know whose paper he is grading. Usually in advance of the examination each examinee is given a number—sometimes his social security number—which appears on all examination papers. Some boards, in order to prevent a substitute from taking the applicant's examination, require that a picture of the applicant be attached to his application, to be checked when he appears at the examination. This is quite a time-consuming process. A more common safeguard is to require the applicants signature either on his paper or a roster to compare with the signature on the original application.

Most state certification boards have a policy of reviewing those examination papers that are just below to just above the passing mark. This will give the board information as to whether or not a question has been misgraded or misjudged that would change the person's grade; either up or down. In most instances, the boards push the scores up a few points through this process. Some states were found to grade on a curve so that at least seventy-five percent of those taking an exam will pass.

Following an examination, all questions are evaluated to determine if there are some which were answered correctly by all or some questions that were missed by all. This is done by the certification board, the examination committee, the office staff, or some individual on the board. In one state, however, the Civil Service Commission was found to use a computer to make this evaluation. With the computer, each question was tabulated showing the number of individuals answering the question right or wrong.

This question analysis can be taken another step further by determining the quartile the examinees was in that answered the question correctly or incorrectly. For instance, in the extreme, if a question was found to have been missed by all the persons in the upper quartile, and all those in a

lower quartile answered it correctly, the question would be analyzed to see if there were some errors in the way the question was stated so that those with considerable knowledge of the subject considered the question from one standpoint and those with less knowledge looked at it from a different standpoint.

Most states have established a procedure permitting an examinee to review his examination. This is usually done only at the headquarters office where the papers are permanently filed. Frequently, the papers are available for four weeks to six months. If many take the examination, this privilege is occasionally extended only to those who failed. In some cases, the person in charge of the office will work each problem out with the examinee when reviewing the examination to make this a learning experience. The examinee may not make notes nor take the paper with him. Ordinarily, the boards do not permit any other person except the examinee to review his paper. Only in rare instances may the examinee authorize another person such as his supervisor to review his paper. Most boards have found it best to limit the review to only the examinee.

Examinations are frequently retained permanently by the Board and become a part of the operator's file. In some cases, the examinations are retained for six months to two years. In one state, it was found that the examinations are retained only for a short time, but the results are placed on magnetic tape.

It is the most common practice to send the examination results only to the individual taking the examination, whether he passed or failed. In some states, however, the supervisor is notified (sometimes by examinee request) when the individual passes an examination, but not if he fails. Yet in other states, the supervisor may be notified only at the individual examinee's request. In some states, announcements of those who pass the examination are given to the news media.

Whether or not a supervisor is notified if a person fails an examination is still primarily dependent on the supervisor as it is his responsibility to employ certified people. Upon being notified of a failure he is required to take appropriate action. In one state the supervisor was not notified of failure unless the individual failed to apply to retake the examination within a certain period of time.

Certificate Renewal

The certificate issued is usually suitable for framing, and sets forth that the person named on the certificate, is qualified to operate a wastewater treatment plant. It normally shows either the type of wastewater plant or the level of certification of the operator, the date issued and the certificate number. Normally it is signed by the chairman and secretary of the certification board.

Most states issue operator's certificate numbers in sequence. Some states are considering a change by providing information in the certificate number, such as: year of issue, class and type of certificate, and the number of certificates of that class issued that year. As an example: 1971-2 WW-5 would indicate that this was the fifth certificate issued in '971 to a class 2 wastewater operator. In one state the certificates show the operator's examination grade on the reverse side.

Renewal certificates are usually smaller in size, frequently of such size that they are carried in an individual's wallet. These are frequently typed but also are commonly prepared on specially printed IBM cards and printed out by computer. In such cases, the person is supplied with two small cards, one suitable for attaching to his framed certificate and one for carrying in his wallet. Colors are usually changed with the year. They are frequently signed only by the secretary to the board and usually show the same type of information as the original certificate, i.e., individual's name, certificate number, level of certification and the date of expiration. In cases where there is no certification board and the program is handled by the agency, the certificate is signed by the agency head and the program secretary.

Some states were found to issue a lifetime certificate which does not require annual renewal. This was the case in three of the six states studied. However, one of these three states did send out annual postcards in an effort to maintain an up-to-date list of certified operators. We found that if there is no renewal program, the list of certified operators continues to grow with no idea as to where an operator might be, or whether he is currently active or inactive. The administrative agency winds up with little or no control under these conditions.

Some states were found to renew certificates annually, others did this only once every three years. The majority of states seem to favor the annual renewal. In those states which did not have renewal, the office managers indicated their belief that some type of renewal program would be of significant assistance to them, recognizing the program weakness without renewal. The primary objection to renewal was found to be the amount of staff time required and the additional work of processing renewals.

Some states having renewal programs require training before a certificate is renewed. One state having annual renewal requires one day of training per year before one can renew one's certificate. In a state where certificates are renewed once every three years, those persons with a top level certificate must have thirty-two hours of training; those at a second level, twenty-four hours training; third level, sixteen hours training; and the lowest or fourth level, eight hours of training before renewal.

Certificate renewal fees were found to vary from state to state. In most cases, the original fees are three to five dollars a year with all certificate renewal fees at the same cost. In one state, however, the renewal fee varies with the level of certification to a maximum of twenty dollars a year for the highest level. The opinion was expressed that employers should be encouraged or required to pay the fees where the level is more than nominal.

In some states, we found that the certification fees are returned to the state general fund and the certification program competes with other department programs for its share of the money on which to operate. Where the fees are earmarked and are returned for the certification board's operation, they may or may not cover the actual cost of operating the board. If they are insufficient to cover the cost, then the department responsible for certification must budget sufficient funds to adequately cover the cost of operation.

When a certificate is awarded, it generally is held permanently. In those states where there are no renewal procedures, it was found that there have been no certificates revoked. Yet there was a state hearing in one case which could have led to certification revocation except that the operator's inadequacies were corrected. Conversely, where certificates are renewed periodically, it is much easier to revoke or refuse to renew a certificate. This was particularly true where training was found to be involved. Specifically, if the certificate holder does not satisfy the training requirements, his certificate is not renewed.

Relationship to Training

As in the other situations related to certification, the extent of coordination with training programs varies in the different states. Yet the importance of this relationship is shown by the necessitated delay of new certification programs in several states until adequate training became available. In one state examined, the person responsible for certification was also responsible for the training programs. In another state, certification was in one department with training and examinations in another with little coordination between the two. In yet another there is a training coordinating committee with representatives from the certification board, the state agencies and the training units working together on a single board to provide the necessary coordination between training and certification.

Operation personnel have indicated that, with training, they understand what is going on and are not just turning valves. In some cases, the operator pays for his own training but usually the employer or the federal government covers the cost of the training. In one state, a non-profit organization handles the training program. All fees are paid to this group, and they in turn develop and arrange for the training in the state.

Many types of training are now available to the operator. Correspondence courses appear quite attractive to those that are capable of working and studying on their own. One of the first correspondence courses available in the United States was that prepared by Clemson University. This is still in use and is geared to various training levels. Another popular course is that prepared by Sacramento State College. EPA has made many of these Sacramento courses available to each state. The original training courses started by the states were the two-to-four day short course type. These courses were designed to review existing knowledge and make available information concerning new developments. These short courses are sometimes used as a means of review for an examination, but this is not the primary purpose.

Many vocational schools and junior colleges receive federal funds to train disadvantaged persons and veterans. In some cases, persons who are already employed at wastewater plants take advantage of these same training courses in their desire to obtain additional information after recognizing their basic deficiencies. These courses vary in length from three months to two years and are usually conducted on the basis of forty hours a week. After the students have received basic mathematics, chemistry and biology information, the instructor will provide opportunities for the class to visit the nearby wastewater treatment plant and observe or work in the plant for training.

Frequently night courses are made available through vocational training schools and junior colleges. These courses are usually taught for four hours an evening once a week to provide for forty-four hours of classroom work. The costs of these courses are frequently paid for by EPA and usually have some "on-the-job" type training connected with them.

One training course examined requires one week of concentrated school work. Following this, the individual is provided with a slide projector and a tape recorder together with slides and tapes so that he can study and work on the lessons on his own. This becomes a modified correspondence type course.

It is noted that many of the courses taught at vocational training schools and junior colleges are at the beginning level and do not provide for training for the upper levels of certification thus requiring personnel who desire to prepare for the higher levels of certification to take correspondence courses.

APPENDIX B

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Model state act for mandatory certification of operators of water treatment plants, water distribution systems, and wastewater facilities

COUNCIL OF STATE GOVERNMENTS

THE COUNCIL OF STATE GOVERNMENTS (COSG) will include in its Volume XXXII, "Suggested State Legislation, 1973," a suggested act requiring certification of operators of water and wastewater facilities. This suggested legislation was part of the recommendations to the COSG Committee on Suggested State Legislation by a National Symposium on State Environmental Legislation. The following, summarizing the events leading up to presentation on May 18, 1972, of the model law to COSG's Committee on Suggested State Legislation, has been provided by Richard Hager of the Environmental Protection Agency (EPA) and George W. Burke of the Water Pollution Control Federation (WPCF) staff.

The Federation has always had a great concern for effective wastewater facility operation and believes that one of the essential ingredients is capable and responsible personnel. Beginning in 1941, the Federation's program on operator qualifications developed a position calling for state programs to examine and certify operators. In 1960, the Federation's Board of Control included in its Statement of Policy on Water Pollution Control a recommendation that the certification of operators by state agencies be required by law. After several years of joint effort among the Conference of State Sanitary Engineers (CSSE), American Water Works Association (AWWA) and the Federation, a model law on operator certification and accompanying suggested regulations were approved and published in the journals of WPCF and AWWA.

With the increasing national demand for effective pollution control, the federal government has taken a policy position supporting operator examination and certification. In 1967, the Federal Water Pollution Control Administration (now EPA) awarded a grant to the Federation to produce materials to promote operator advancement by mandatory certification, and, more recently, EPA included the requirement of operator certification in its "Federal Guidelines on Design, Operation and Maintenance of Wastewater Facilities," which was promulgated under Section 601.35 of Title 18 of the Code of Federal Regulations. In further evidence of the federal policy, federal agencies are required, in accordance with Executive Order 11507, "Prevention, Control and Abatement of Air and Water Pollution at Federal Facilities," to have their employees who are responsible for operation of wastewater facilities certified under the programs administered by the state governments in which they operate. When no state program is conducted, the federal agency will set requirements in collaboration with the states for use in evaluating federal employees and employees of projects which are constructed with federal funds.

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While conducting its program under the grant from EPA, the Federation learned that there was a need to develop criteria that could be used to improve some of the state mandatory certification programs and reduce the diversity of programs throughout the U. S. During 1971 and early 1972, the Federation assisted representatives of several state certification programs to develop a proposal for organizing the various state certification boards. During this effort, representatives of Canadian agencies and associations indicated an interest, and the organization was expanded to include Canadian and Mexican programs. In June of 1972, representatives of 22 states and 24 certification programs met in Chicago and agreed on organizing an Association of Boards of Certification, approved a constitution, and elected officers. The Executive Committee of that association, which includes representatives of AWWA and WPCF, met several times to organize and develop a program. The objectives of the organization include:

1. Improvements in operator certification laws and their administration and effectiveness;

2. Promotion of operator certification as a means of insuring effective operation;

3. Definition and maintenance of nationally recognized qualifications for operator certification in established categories;

4. Promotion of uniformity of standards and practices in operator certification;

5. Facilitation of inter-board transfer of certification for qualified individuals; and

6. Assistance to newly created boards as they set up their initial policies.

The EPA, in support of its position on operator certification, submitted for discussion a model law on operator certification to the National Symposium on State Environmental Legislation held in Washington, March 15–18, 1972. The symposium brought together for the first time all elements of state government and representatives from federal agencies to develop suggested state legislation on a broad range of ecological concerns. Participants in the symposium included state legislators throughout the nation, representatives of offices of the governors and the state attorneys general, and heads of state environmental agencies. Ten workshops provided the focus for discussion of the various state environmental legislation suggestions. The workshop, which discussed the model state law on operator certification, consisted of state officials representing certification programs and staff of the EPA's Manpower and Training Program. The workshop revised the draft model and reported the results of its efforts to the symposium. The symposium, in turn, recommended it to the COSG Committee on Suggested State Legislation. Before the meeting of the latter committee (May 18–19, 1972), opportunity was afforded to WPCF to make suggestions for revision. Several suggestions were made and have been incorporated as revisions in the document.

At the request of EPA and because of the inability of the chairman of the WPCF Personnel Advancement Committee to attend the meeting, WPCF's George W. Burke accompanied EPA's Richard Hager for a presentation and discussion of the model with the COSG Committee on Suggested State Legislation at its May 18 meeting in Washington, D. C. At the request of the Environmental Subcommittee of the Committee on Suggested State Legislation, Hager and Burke made revisions that added specimen regulations for certain provisions of the suggested state legislation. These regulations, annexed to the suggested state legislation, were excerpts from the CSSE–AWWA–WPCF model law and regulations to illustrate the kinds of regulations that might be promulgated under authority of the suggested legislation. The Environmental Subcommittee recommended approval of the revised presentation, with the full committee adopting the subcommittee's recommendation for publication in Volume XXXII Suggested State Legislation, 1973, during the fall of 1972.

MODEL STATE ACT FOR MANDATORY CERTIFICATION OF OPERATORS OF WATER TREATMENT PLANTS, WATER DISTRIBUTION SYSTEMS, AND WASTEWATER FACILITIES

Bill No. ———

An act to protect the public health and to conserve and protect the water resources of the state; to provide for the classifying of all public and private (including industrial) potable water supply systems and public and private (including industrial) wastewater facilities to require the examination of operators and certification of their competency to supervise the operation of such facilities; to prescribe the powers and duties of the State Director in these matters; to provide for the promulgation of rules and regulations; to create a board of certification; to provide for reciprocal arrangements, and to prescribe penalties for violation of the act.

Be it enacted by the Legislature of the State of ————————.

Section 1. Title.

This Act shall be known and may be cited as the "(State) Law for Mandatory Certification of Operators of Water Treatment Plants, Water Distribution Systems, and Wastewater Facilities."

Section 2. Definitions.

A. The term "person" shall mean any individual, partnership, firm, association, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, municipality or any other political subdivision of this State, any interstate body, or any other legal entity.

B. The term "operator" shall mean the person in responsible charge of the operation of a potable water treatment plant, water distribution system or wastewater facility.

C. The term "water supply system" shall mean the system of pipes, structures, and facilities through which water is obtained, treated and sold, distributed or otherwise offered to the public for household use or any use by humans.

D. The term "potable water treatment plant" shall mean that portion of the water supply system which in some way alters the physical, chemical, or bacteriological quality of the water being treated.

E. The term "wastewater facility(ies)" shall mean the structures, equipment, and processes required to collect, carry away and treat domestic and industrial waste and dispose of the effluent.

F. The term "water distribution system" shall mean that portion of the water supply system in which water is stored and conveyed from the potable water treatment plant or other supply point to the premises of a consumer.

G. The term "nationally recognized association of certification authorities" shall mean that organization which serves as an information center for certification activities, recommends minimum standards and guidelines for classification of potable water treatment plants, water distribution systems and wastewater facilities and certification of operators, facilitates reciprocity between state pro-

grams, and assists authorities in establishing new certification programs and updating existing ones.[1]

H. The term "Director" shall mean the head of either the State Health Department or State Water Pollution Control Authority which is assigned responsibility for administration of this Act.

SECTION 3. Classification.

The Director shall classify all potable water treatment plants and water distribution systems actually used or intended for use by the public, and wastewater facilities which discharge into publicly owned wastewater systems, receiving streams or land used by others. The classification shall take due regard to size and type, character of water or wastewater to be treated, and other physical conditions affecting such treatment plants and distribution systems and according to the skill, knowledge, and experience required of an operator.

SECTION 4. Certification.

The Director shall issue certification entitling qualified persons to supervise the operation of potable water and wastewater facilities and water distribution systems after considering the recommendations of the State Board of Certification.

SECTION 5. State Board of Certification.

Creation. To be determined. A State Board of Certification shall be appointed by the Governor to advise and assist the Director in the administration of the certification program.

SECTION 6. National Association of Certification Authorities.

The Director is authorized when taking action pursuant to Sections 3, 4 and 8 of this Act to consider generally applicable criteria and guidelines developed by a nationally recognized association of certification authorities.

SECTION 7. Certification Requirement.

One year following the effective date of this Act, all potable water treatment plants, water distribution systems and wastewater facilities whether publicly or privately owned, used or intended for use by the public or private persons must at all times be under the supervision of an operator whose competency is certified to by the Director in a classification corresponding to the classification of the plant or distribution system to be supervised.

SECTION 8. Regulations.

The Director, with the advice of the State Board of Certification shall promulgate such rules and regulations as may be necessary for the administration of this Act, and shall include at least the following provisions:

(*a*) the basis for classification of potable water treatment works, wastewater facilities and water distribution systems (including the type and size of lesser

[1] A national Association of Boards of Certification was organized in June 1972 under the auspices of AWWA and WPCF.

facilities as to which the provisions of this Act shall not apply) as required by Section 3 of this Act; [1]

(*b*) criteria for the qualification of applicants for operator certification for each of the classifications referred to in subsection (*a*) of this section; [2]

(*c*) procedures for examination of candidates, and renewal of certificates; [3]

(*d*) procedures for the revocation of certificates; [4]

(*e*) requiring as to which additional persons shall be certified where more than one operator shall be required to be in responsible charge.

SECTION 9. Prohibited Acts.

On or after one year following the effective date of this Act, it shall be unlawful:

(*a*) for any potable water treatment plant, water distribution system or wastewater facility to be operated unless the operator is duly certified under the provisions of this Act;

(*b*) for any person to perform the duties of an operator without being duly certified under the provision of this Act.

SECTION 10. Injunctions and Civil Penalty.

Any person who violates or is about to violate any provision of this Act, or any rule, regulation, criteria, procedure or certificate issued hereunder may, in a legal action commenced by the Director:

(*a*) be enjoined from continuing or commencing such violation; and

(*b*) be subject to a civil penalty not to exceed $10,000 per day of continuing violation.

SECTION 11. Criminal Penalties.

A. Except as provided in subsection B of this section, any person who knowingly and wilfully violates section 9 of this Act shall upon conviction be punished by a fine of not more than $10,000 per day of violation or imprisonment for not more than six months, or by both.

B. Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under this Act, or by any rule or regulation promulgated under this Act, shall upon conviction, be punished by a fine of not more than $5,000 or by imprisonment for not more than six months, or by both.

SECTION 12. Administration.

To carry out the provisions and purposes of this Act, the Director is authorized and empowered to:

(*a*) perform any and all acts and adopt, revise, promulgate and rescind such rules and regulations as he may find necessary or appropriate;

(*b*) enter into agreements, contracts, or cooperative arrangements, under such terms and conditions as he deems appropriate with other State, Federal, or interstate agencies, municipalities, educational institutions, or other organizations or individuals.

[1] See "Recommended Regulations for Section 8(a)," page 1890.
[2] See "Recommended Regulations for Section 8(b)," page 1891.
[3] See "Recommended Regulations for Section 8(c)," page 1893.
[4] See "Recommended Regulations for Section 8(d)," page 1894.

(*c*) receive financial and technical assistance from the Federal Government and other public or private agencies;

(*d*) participate in related programs of the Federal Government, other states, interstate agencies, or other public or private agencies or organizations;

(*e*) upon request, furnish Federal, State or interstate agencies, municipalities, educational institutions and other organizations and individuals, reports, information and materials relating to the certification program authorized by this Act;

(*f*) establish adequate fiscal controls and accounting procedures to assure proper disbursement of and accounting for funds appropriated or otherwise provided for the purpose of carrying out the provisions of this Act;

(*g*) the Director may delegate those duties and responsibilities as deemed appropriate for the purpose of administering requirements of this Act;

(*h*) the Director may establish and collect such fees for conducting examinations and issuing or renewing certificates as are necessary for the support of this Act.

SECTION 13. Annual Report.

Within twelve months from the effective date of this Act, and annually thereafter, the Director shall submit, through the Governor, a report to the State Legislature, summarizing the actions taken under this Act, and the effectiveness of such actions and such information and recommendations, including legislative recommendations, as he deems appropriate.

SECTION 14. Reciprocity.

A. On or after the effective date of this Act, certification of operators by any State which, as determined by the Director, accepts certifications made or certification requirements deemed satisfied pursuant to the provisions of this Act, shall be accorded reciprocal treatment and shall be recognized as valid and sufficient within the purview of this Act, if in the judgment of the Director the certification requirements of such State are substantially equivalent to the requirements of this Act or any rules or regulations promulgated hereunder.

B. In making determinations pursuant to subsection A of this section, the Director shall consult with the State Board of Certification and may consider any generally applicable criteria and guidelines developed by the nationally recognized association of certification authorities.

SECTION 15. Authorization.

There are hereby authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act.

SECTION 16. Repealer.

The provisions of this Act are intended to supersede existing laws of this State insofar as they relate to the matters included in this Act.

SECTION 17. Severability.

The provisions of this Act are severable. If any provisions of this Act or the application thereof to any person or circumstance is held invalid, the invalid-

ity shall not affect other provisions or applications of this Act which can be given effect without regard to the invalid provision or application.

SECTION 18. Effective Date.

The effective date of this Act is ————————.

REGULATIONS RECOMMENDED FOR SECTION 8(a)

Classification of Water Treatment Plants and Distribution Systems

A. Classification shall be generally in accordance with the following four classes except that the Board may make changes in classification in accordance with the needs created by particular complexities of any specific plant or distribution system by reason of special features of design, or by reason of a source of supply which is particularly hazardous, or characteristics which make operation more difficult than normal, or a combination of such conditions.

CLASS I

1. All plants not listed in other classes requiring chemical control of operation and designed to serve a population of less than 15,000.
2. All distribution systems serving a population of less than 15,000.

CLASS II

1. All plants using filtration or chemical softening processes requiring chemical and bacteriological control and designed to serve a population less than 2,000.
2. All plants using chlorination requiring bacteriological control of operation and designed to serve a population less than 15,000.
3. All other plants requiring chemical control of operation designed to serve a population in excess of 15,000.
4. All distribution systems serving between 15,000 and 50,000 population.

CLASS III

1. All plants using filtration or chemical softening processes requiring chemical and bacteriological control of operation and designed to serve between 2,000 and 15,000 population.
2. All plants using chlorination requiring bacteriological control of operation and designed to serve a population in excess of 15,000.
3. All distribution systems serving in excess of 50,000 population.

CLASS IV

All plants using filtration or chemical softening processes requiring chemical and bacteriological control of operation and designed to serve a population in excess of 15,000.

B. Classification of any treatment plant may be changed at the discretion of the Board by reason of changes in any condition or circumstance on which the original classification was predicted. Due notice of any such change shall be given to the owner of the treatment plant.

Classification of Wastewater Plants

A. Wastewater treatment plants shall be classified in one of four classes. These classifications shall be made according to population served, type of works, character and volume of wastes to be treated, and the use and nature of the water resources receiving the plant effluent. Classifications shall be based on the population served or for which the plant is designed except that plants may be classified in a group higher than indicated at the discretion of the Board by reason of the incorporation in the plant of special features of design or characteristics more difficult to operate than usual, or by reason of a waste unusually difficult to treat, or by reason of conditions of flow or use of the receiving waters requiring an unusually high degree of plant operation control or for combinations of such conditions or circumstances.

Class I—Plants serving a population of less than 2,000.
Class II—Plants serving a population between 2,000 and 10,000.
Class III—Plants serving a population between 10,000 and 40,000.
Class IV—Plants serving a population in excess of 40,000.

B. Classification of any treatment plant may be changed at the discretion of the Board by reason of changes in any condition or circumstance on which the original classification was predicted. Due notice of any such change shall be given to the owner of the treatment plant.

REGULATIONS RECOMMENDED FOR SECTION 8(b)

Operator Qualifications and Classifications for Water Treatment Plants and Distribution Systems and Wastewater Treatment Plants

A. Operators shall be examined by the Board as to education, experience, and knowledge as related to the classification of plants or distribution systems for which examined. Applicants shall be required further to give evidence of good moral character, dependability, initiative, interest in his work, and other pertinent characteristics in relation to responsible supervision over operations. Applicants must pass the required written examination.

B. In evaluating qualifications of operators, the Board will be guided by the following:
   1. Experience requiring some technical knowledge of the work and whether or not responsible charge of work was included. In large plants where responsibility is divided, supervisors of important divisions may be credited with having responsible charge.
   2. Experience, to be acceptable, must be the result of satisfactory accomplishment of work. Evaluation may be based on reports of state health, water pollution control, or other agencies having appropriate responsibilities for supervising systems and plants.
   3. Partial credit may be given for operating experience in maintenance, laboratories, or other work of water and/or wastewater systems and allied trades such as plumbing.
   4. Where applicable, education may be substituted for a portion of experience requirements as specified below:
      (*a*) One year of appropriate college work may be considered as equivalent to a maximum of two years of experience (or one year of experience with responsible charge).

(*b*) Where education is substituted for experience, it shall not exceed an amount which would reduce the requirement of actual experience to less than one year for any classification or less than two years actual experience for Classes II and III and three years for Class IV.

(*c*) Education applied to experience requirement cannot also be applied to education requirement.

5. Where applicable, experience may be substituted for educational requirements as specified below:
   (*a*) One year of experience may be considered as equivalent to a maximum of two years of high school.
   (*b*) One year of responsible charge or two years experience in an important phase of operation, other than responsible charge will be considered as equivalent to a maximum of one year of college.
   (*c*) Experience applied to educational requirement may not also be applied to the experience requirement.
6. Substitutions for formal education may be made as follows:
   (*a*) Satisfactory completion of approved applicable courses of study such as correspondence courses or short courses will be equivalent to a maximum of six months of college or one year of high school.
   (*b*) An acceptable high school equivalency certificate may be used to substitute for graduation from high school.

C. Water and Wastewater Treatment Plant Operators.
Four classes of operators are hereby established. Their qualifications are intended to relate as nearly as possible to the corresponding classifications for either water or wastewater treatment plants.

CLASS I

1. Completion of high school or equivalent, and
2. One year of acceptable operation of a treatment plant.

CLASS II

1. Completion of high school or equivalent, and
2. Three years of acceptable operation of treatment plants of Class I or higher.

CLASS III

1. Completion of high school or equivalent, and
2. Three years of acceptable operation of treatment plants of Class II or higher, two years of which must have been in a position of major responsibility.

CLASS IV

1. A college degree or completion of two years in a standard curriculum in engineering or allied sciences or equivalent, and
2. At least five years of acceptable operation of treatment plants in Class III or higher, two years of which must have been in a position of major responsibility.

D. Water Distribution System Operators.
The requirements for distribution system operators in a given category are the same as those for treatment plant operators, except that the experience requirements are for the distribution system in the group under consideration instead of the treatment works.

REGULATIONS RECOMMENDED FOR SECTION 8(c)

EXAMINATIONS

A. The Board shall prepare written examinations to be used in determining knowledge, ability, and judgment of the operators.
B. Examinations shall be held at places and times set by the Board, with a suitable method of advance announcement made by the Board. They shall be conducted at least annually.
C. Except in such cases as the Board may decide represent proper exceptions, all examinations shall be written. All examinations will be graded by the Board, or by others designated by the Board, and the applicant notified of the outcome. Papers will not be returned to the applicant, but means will be provided to review the results with a member of the Board or State Health Department on request by the applicant.
D. Separate examinations will be prepared to cover basic differences in the duties and responsibilities of operators, types of facilities, variations in wastewater quality, conditions of receiving waters, and other pertinent matters.
E. Applicants who fail to pass examination may repeat the examination at subsequent regularly scheduled examinations.

ISSUANCES OF CERTIFICATES

A. On satisfactory fulfillment of the requirements provided herein and based on the recommendation of the Board, the Commissioner shall issue a suitable certificate to the Applicant designating his competency. The certificate will indicate the class of treatment plant or water distribution system for which the operator is qualified.
B. Certificates shall be permanent (indicate time limit if preferred) unless revoked for cause, replaced by one of a higher grade, or invalidated under subsection E below.
C. Certified operators who desire to become certified in a higher grade must satisfactorily complete the requirements before a new certificate is issued.
D. Certificates shall be valid only so long as the holder uses reasonable care, judgment, and application of his knowledge in the performance of his duties. No certificate will be valid if obtained through fraud, deceit, or the submission of inaccurate data on qualifications.
E. The certificate of operators who terminate their employment at a treatment plant will be valid for two years. After two years, the certificate will automatically be invalidated. Operators whose certificates are invalidated may be issued new certificates of like classification provided appropriate proof of competency is presented to the Board. Successful completion of an examination may be required at the discretion of the Board.
F. Certificates may be issued, without examination, in a comparable classification to any person who holds a certificate in any state, territory, or possession of the United States or any country, if in the judgment of the Board the

requirements for certification of operators under which the person's certificate was issued do not conflict with the provisions of this Act and are of a standard not lower than that specified by regulations adopted under this Act and providing further that reciprocal privileges are granted to certified operators of this state.

G. Certificates in an appropriate classification will be issued to operators, who, on the effective date of this program, hold certificates of competency attained by examination under the voluntary certification program now being administered by the State Health Department (or other designated agency).

H. Certificates of proper classification may be issued without examination to the person or persons certified by the governing body or owner to have been in responsible charge of the water treatment plant, water distribution system, or wastewater treatment plant on the effective date of this Act. A certificate so issued will be valid only in that plant or system.

Regulations Recommended for Section 8(d)

Revocation of Certificate

The Commissioner may revoke the certificate of an operator, following a hearing before the Commissioner or his designated representative, when it is found that the operator has practiced fraud or deception; that reasonable care, judgment, or the application of his knowledge or ability was not used in the performance of his duties; or that the operator is incompetent or unable to perform his duties properly. Appeal from the decision of the Commissioner may be made to any court or competent jurisdiction.